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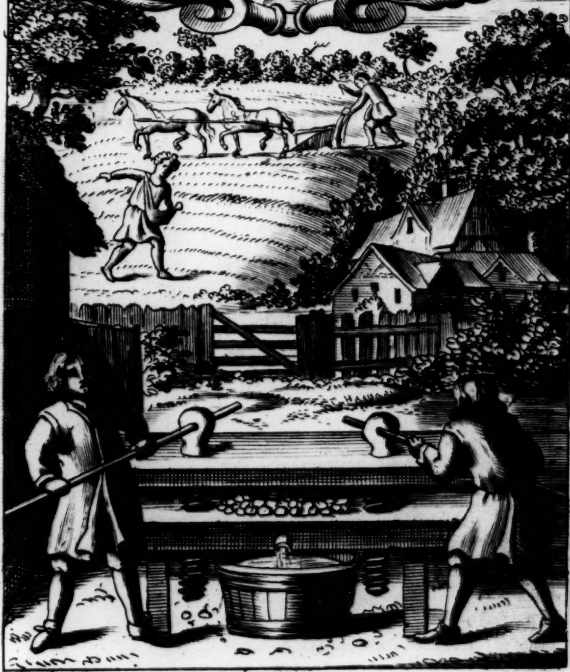
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The Second Part of
Systema Agriculturae, or y^e
MISTERY of HUSBANDRY
& Vinetum Britannicum or
Treatise of Cider &c.
by I. W. Gent.





THE
SECOND PARTS
OF
Systema Agriculturae,
OR THE
Mystery of HUSBANDRY.
AND
Vinetum Britannicum,
OR, A
TREATISE OF CIDER.

Wherein are contained many Select and
Curious Observations and Novel Experi-
ments relating to Husbandry and Fruit-trees.

With the best and most Natural Rules
and Methods for the Making of *Cider*,
and other *English-Liquors*.

To which is added,
An Essay towards the discovery of the
Original of *Fountains* and *Springs*.

By *J. W. Gent.*

London, Printed for *George Grafton* at the *Mitre*
in *Fleetstreet*, near *Temple-Bar*, 1689.

RECORDS OF THE

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SECRETARY OF THE

WAR DEPARTMENT

WASHINGTON

1864

VOLUME 1

PART 1

1864

P R O O E M I U M

I N

Laudem Agriculturæ.

Being the

P R E F A C E

O R

I N T R O D U C T I O N

T O T H I S

Second Part.

*Shewing the great Advantages that
Husbandry bringeth to Trade,
and the dependencies the later
hath on the former.*

I N the *Preface* to my former
Treatise of *Husbandry*, I did

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somewhat elucidate the excellency and utility thereof, it being an Art that hath the least dependency on other Arts of any whatsoever, being content with only a few Tools for the breaking the stubborn Clods of the Earth, and the more easie separating the Seed from the Husk; when there is no other *Science, Art, or Trade*, but hath mediately or immediately an absolute reliance or dependency on *Husbandry*, or some of its Branches; As *Cicero* once said, *Præclare & ille dixit, qui perhibuit Agriculturam aliarum Artium Matrem esse ac Nutricem.* More especially the Maritime Trade of the whole World hath for the most part regard to the Products of the Earth obtained by Humane Labour and Industry: As
the

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the *Silks* and *Spices* of *Asia*, the *Sugar*, *Tobacco*, *Indico*, &c. of *America*, first advanced Trading thither, and are yet the principal Commodities which allure our *Europeans* to make so long and dangerous Voyages into those remote Parts. As for *Metals* and *Minerals*; another part of the subject of Trade, although I have not treated hitherto of them, yet may their extraction out of the obdurate parts of the Earth be deem'd a Branch of *Agriculture*.

It is particularly observ'd, that the planting of some certain Species of Vegetables, in places wherein they delighted, hath acquired unto, and maintain'd a Trade there: As the planting of *Tobacco* in *Virginia*, *Sugar* in *Barbadoes*, *Currans* in the Isle of *Zant*, *Vines*

in the *Canaries* and in *France*. The like Instances may be produced of many other places, that by this Art of *Agriculture* only, have been infinitely enrich'd, and their Trade advanced.

It will be objected (I know) that there are many places very much enriched and improved by Trade, that have very little of *Agriculture* used therein; nor have the Inhabitants thereof but little Land to till or improve, having not Corn enough of their own growing to feed them: As *Venice*, and some of the *Provinces* of the *Low-Countries*, &c. and yet no places flourish more than these by Trade only. To which it may be answered, That although they have but little Land of their own, yet are they and their Trades maintained

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tained by the Husbandry of their Neighbours: As *Middleburgh* in *Zealand*, *Amsterdam* in *Holland*, *Hamborough*, &c. depend on, and are maintained by the Husbandry of their Neighbouring *Germans*, *Danes*, &c. from whom they have their Corn, Cattel, &c. And to whom in lieu thereof they carry their own Manufactures, and the Products of foreign Countries. And one of the particular Reasons why they grow so rich and great on so small Territories, is the situation of their Countries, lying as places of Rest, in their Navigations between one Country and another, and of refuge and security from the Attaque of Enemies, wherewith the Seas are generally incumbred: And it doth not at all lessen the Obligation that *Trade* hath

hath to *Husbandry*; because many Countries, Cities, and places thrive so well where Husbandry is not used.

For the City of *London*, notwithstanding its great Trade, and many Noble and Wealthy Inhabitants in it and its Suburbs, cannot subsist without the Husbandry of many of the Neighbouring Counties, whose daily labour and industry in that Art, are the principal means of preserving and maintaining that great City, not only in their habitations and necessities for life, but in many things useful towards the Support of their Trade and Traffic.

And it is also observable, That where *Agriculture* is slighted, neglected, or not used, Trade is not considerable in such places: As
on

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on the incultivated Coasts of *Africa* and *America* ; In some places whereof little is to be had by our Merchants , besides the Skins of Wild Beasts, or *Elephants* Teeth ; and in other places nothing at all. Although the Soil may be rich, and the Countries populous, but with Inhabitants lazy and ignorant, feeding on the Productions of Nature, without any other labour or industry, than Hunting, Fowling , or gathering of Fruits.

In that great Kingdom of *Spain*, since the Expulsion of the *Moors* , *Agriculture* hath been much neglected, which hath reduced that Kingdom to so mean a Condition, as to its Trade, that it would be of little worth, did not other Nations maintain it, for
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the lucre of its *American* Products.

The fertile Kingdom of *Ireland*, for want only of People to cultivate its rich and vast Wafts and Territories, maintaineth but a small Trade in comparison of its Neighbours.

So that if it be granted that an industrious tilling and improving of Lands, is a principal means to beget and support a Trade; and that the neglect thereof, or the inaptitude of a place for Tillage be likewise a means of the decay or defect of Trade; then will it not be denied, that Trade hath a dependency on *Agriculture*; and that to promote this noble and ingenious Science and Art of *Agriculture*, is one of the principal Encouragements to Trade, and will

will furnish the Tradesman and Mechanic, not only with all Materials whereon to imploy his Art and Cunning, but with Food and Rayment for him and his Family, whilst he is advancing the Trade of the Nation, and heaping up Riches for himself and his Posterity.

To descend to particulars within this flourishing Kingdom of *England* (our Native Soil ;) It is most evident, that in such parts thereof, where there is the greatest plenty of Materials to work on, and necessaries for the Operators, there is the greatest Trade managed : As in *Shropshire* and places adjacent , where there is great plenty of *Iron* and *Coal*, and cheap living for the Workmen, by reason of the plenty of all sorts
of

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of Food, &c. which the Earth produces through the labour and industry of the Husbandman, Vast quantities of all sorts of Iron-work used in Building, &c. are there made, not only to serve the necessary occasions of many in this Kingdom, but to furnish Foreigners withall, to the great encrease of the National Trade abroad.


The like may be said of *Sheffield, Rippon, Bedal, &c.* in *Yorkshire*, famous for driving the Trades of *Cutlers, Spurriers, Lorriners, &c.* All which sorts of Iron-Ware cannot be made at so low Rates in other places, where Meat, Drink, &c. are not so cheap, so as to maintain a general Trade to advantage, notwithstanding there may be the like plenty of the Materials to be wrought upon: And yet

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yet in these places of Trade the Husbandman thrives better, than where a Market is wanting. For a quick Market, although at a reasonable price, is his delight.

Many places in this Kingdom are famous for the divers Manufactures made of *Wool*, by reason of the plenty of that Commodity, and of the Products of Husbandry. For those Manufactures are generally made in places where the Markets for Provisions are reasonable, which with the Frugality of the *Spinners, Weavers, &c.* support that Trade. For we see that the *French*, who buy *Wool* here, export it with difficulty and cost ; yet by their cheap living in their own Country make it into Cloath, &c. and sell it at as low Rates in Markets abroad as the
English :



English: From whence it is not unreasonable to conclude, that if we have our Provisions for the Back and Belly cheaper than they (our *Wool* here being to be had at lower Rates than they can have it) we may under-sell them in any place of the World. Therefore to maintain our Cloathing-Trade abroad, and lessen theirs, we must be obliged to the Husbandman, and the parsimonious living of such Mechanics that are exercised in these Trades.

And as our Husbandry brings plenty to the Market, and such plenty supporteth and encourageth the Mechanic; so it likewise produceth many Commodities, which without any, or very little, of the aid or assistance of any other than the Husbandman
and

&c. Or yield some Commodity for the Merchant, as *Butter, Cheese, Bacon, Ox-Bones, Leather, Coney-Skins, Coney-Furre, Wool, Wax, Tallow, Horn, &c.*

The *Husbandry* of *England* likewise produceth several Materials on which the Mechanical part of the People imploy themselves: As *Wool* for the making of *Cloath, Serges, Bays, Flannel, Stockings, Hats, &c.* *Hair*, for the making of *Hair-Cloathes, Lines, Buttons, &c.* *Skins* of Beasts, for the making of *Shoes, Gloves, &c.* *Corn* and *Grain*, for the making of *Bisket, Beer, Mum, distilled Spirits, &c.* *Seeds*, for the making of Oils, as *Linseed, Rapeseed, &c.* *Iron-Oar* for the making of *Iron, Steel*, and an infinite number of *Tools, Instruments, Nails, Locks, &c.*
made

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made of that Metal; and fine *Clay* for the making of *Tobacco-Pipes*, and great variety of *Earthen-Ware*, which are glazed with our Minerals, with very many other Wares and Commodities that are either exported, as they are at first produced, or otherwise wrought into some other form by the Art of the Workman. By all which means the Foreign Trade of this Kingdom is supported, and our great and numerous Fleets trading to all quarters of the Earth maintained.

In return whereof are imported *Raw Silks*, *Camels Hair*, and *Goats Hair*, *Cotton*, *Elephants Teeth*, &c. which being wrought here into various forms, are again exported to the great advantage of Trade. It is true that the Artificers, that

for the most part , convert these foreign Commodities into Manufactures, to the great Improvement of their Value, inhabit in or near *London* , and gain much Riches by their Pains and Industry, where Provisions are dearer than in the remote parts in the Country : The reason whereof is, that the City is the place for the Importation of those Commodities, and the place where curious Artificers , as well Strangers as Natives, Inhabit ; and where they have the greatest Encouragement by their great Wages they make of their Skill and Industry : And the greatness of the Domestic Trade there, takes off the greater part of their Manufactures ; (part thereof being exported) and for that no other Port in this Kingdom hath
a Trade

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a Trade sufficient for the Exportation of such Manufactures.

Another Return of our Commodities exported, are such things that are necessary to support our Healths, and add to the pleasure of our Lives, and satisfaction of our Minds: As *Spices, Druggs, divers sorts of Fruits, Sugars, Wines, Silver, Gold, Copper, fine Linnen, Paper, &c.* Great quantities whereof are annually imported and consumed in this Kingdom, to the no small Encouragement of Trade, and consequently of Husbandry.

Thus by the Richness of our Soil, the great plenty of Mines, Minerals, Timber, Woods, Corn, Grain, Cattel, &c. and the Labour, Industry, and Ingenuity of the Husbandmen is the Trade of
a 3 *England*

England maintained, which hath made it Famous throughout the Universe, That it is most worthily esteem'd the *Queen of Isles*, and made it Rich and Powerful: Its Store-houses being Replete with the Riches of the *Indies*, and other parts of the World; and its Inhabitants cloathed with the Silks of *Asia*; Their Coffers filled with the *Metals* of *Africa* and *America*; and every one from the greatest almost to the meanest solacing themselves on the rich *Cates, Wines, and Fruits*. of *Europe*, and other foreign Parts.

Therefore the more Foreign Trade is encouraged and encreased, the better will the Husbandman thrive, because his Commodities will be the better vendd. And the more Husbandry encreases,

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increases, the more plenty will there be of its Products to support and maintain that Trade. For it is the plenty and the lowness of the Prizes of our Native Commodities that begets and maintains a Trade abroad.

It is not the great consumption of our own Products that encreaseth our Wealth, as is vulgarly thought: For the more we consume, the less is left to transport, and the Rates of it the higher, and so the Trade the less. As in Wheat and other Grain in such years wherein we have plenty, and that the Prizes are low, much is exported, because our Merchants are able to undersell others in Foreign Markets. And what quantities soever are vended abroad we have suitable Returns

for the same. Now were there any contrivance in a plentiful year of Corn, to make a Consumption at home of a part of that Crop, whereby to enhance the prizes to the enriching of the Farmer; this would be so far from being an enriching of the Nation, that it would manifestly appear to be a loss. For it is not the gain of the Husbandman, in his ordinary way of Husbandry, by the rise of his Commodity; nor of a Tradesman in his ordinary way of Trade, that enriches the Nation. As in this present year 1688, this Nation is blessed with a double Crop of Wheat, and a plenty of all other Grain. Now to export a moyety of this Crop, would very much advantage the whole, when a Consumption

sumption at home would only a few.

It is not the burying of our Woollen that advantageth the National Trade, but would rather be a prejudice to it, by consuming so great a quantity of that Commodity; were it not that it prevents the Consumption of the like quantity of Foreign Linnen. For the more Wool our Flocks yield, and the lower the price of it is, and the cheaper our Provisions are, the *Clothier* can the better afford his Cloaths at a reasonable rate to the Merchant, and he the better dispose of them in a foreign Market. The like may be said of all other Growths and Manufactures.

But here it will be objected, that when Wool is at a low price,
Foreigners

Foreigners buy it, transport it, and convert it abroad into Manufactures, and by that means undersell us, to the great prejudice of Trade: To which may be answered, That it is our faults that we cannot work it, so as to afford a better Pennyworth than they: And some of the Reasons why we work not so cheap as Foreigners do may be these:

First, Our Land is very fruitful, and yields more increase for ordinary Food, &c. than there are Inhabitants to consume it, which begets a Laziness in the meaner sort of People in many places, that they will not work hard, because easie Labour will maintain them: As on the contrary may be perceived by the more Industrious (for all are not Lazy,
nor

nor is it a Disease in all parts of the Kingdom,) who by their Labour in several Mechanic Trades, as well as by Husbandry, do not only maintain their Families, and bring up their Children to work, but encrease in Riches, laying up for their Posterities: Which Indicates

The second Reason, *viz.* Want of Inhabitants: For were there more Hands, more Work might be done, more Provisions spent, to the Incouragement of Husbandry, and there would be more Husbandmen employed; that instead of raising the prizes of Tillage, &c. there would be a greater plenty. For our Lands, if well tilled, would in all probability yield Provision enough for three times the People more than
now

now it doth. For if there were more People, they must work cheaper; and if Provisions were more plenty, they might the better afford it. And in case that People were multiplied, by consequence Trade would encrease, and Laziness decrease, it being only the Richness of the Country, with the paucity of Inhabitants, that begets so great a Pigrity: No places yielding more *Commoners*, *Vagrants*, or idle People, than those parts where no public Trade is managed; Employment attracting People, and People expending the encrease of the Earth, which begets a quick Market, the Joy of the Husbandman; and the better the Land is tilled, the more plenty and cheap the Product is.

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There are other Reasons why our Manufactures of Woollen, Linnen, &c. are not Wrought so cheap here as in other Countries, and why our Country is not more peopled than it is, which have been at large set forth by others; and the treating of them, and the removing some Impediments to Trade, appertain to others, and not to a plain Rustic. Only here may be observed, That the Prodigality of our Gentry and Citizens, and the great Consumption of our home Commodities, Manufactures and Provisions, which seemingly are the occasions of great Returns, and encrease of an Inland-Trade, and the enriching of many private Tradersmen and others, is not in any wise profitable to the whole:

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But on the contrary, Parsimony in all our Necessaries, whether Foreign or Domestic, is most advantageous to the Kingdom in general; for the less of our own we consume, the more we have to sell to our Neighbours, and the cheaper; for Plenty and low price attracts a Trade; and the less of Foreign we consume, the more of their Coin or Bullion would be brought in Exchange for our Commodities: So that instead of the Surplusage of their *Wines, Fruits, Silks, &c.* more than we need, our *Bullion* would encrease. For it was the overbalance of our home Commodities and Manufactures exported, to such that were imported, that from time to time brought into our Hands those vast quantities
of

of Gold and Silver, that for the plenty of those Metals we seem to Vie with the Masters of the *Indian* Mines ; and it is the continuing of such an overbalance that must maintain that Import, and the defect thereof may in time occasion the Exportation of the same Riches. As sometimes hath happened, that in a year of scarcity of Corn here, which usually happens once in 10 or 12 years, that we are forced to buy of our Neighbours. Their plenty draws great Sums of ready Mony out of our Pockets, because we want more of their Corn than they of our Manufactures, or other Wares.

Therefore to conclude this short *Preface*, My advice is to the honest Husbandman, to Educate
his

his Children to Labour, and to Live sparingly; and to the Tradesman to be diligent in his Calling, to the encrease of the Manufactures of the Nation. And to all others (to whom Honours, Preferments, and Estates have not descended, whereby to maintain or employ them in Higher or other Capacities equally necessary to support Order, &c.) To employ themselves and their Stocks in managing of *Agriculture* or Trade. And to propose and find out the most easie and frugal ways of doing such things that now require great cost and labour to accomplish. As in making Rivers Navigable to facilitate that troublesome way of Carriage now used, which in many places may be done.

In

In making Wains, Carts, Ploughs, &c. to be drawn with less strength than now they are, in making High-Ways more passable, and in erecting Bridges, &c. for the fewer Cattel are employed in Husbandry, the more may be spared to send abroad; and the fewer hands used thereabouts, the more may be spared for Mechanic Arts; for it's much more profitable to Export our Commodities wrought than unwrought. For the making of the several Rivers Navigable to *Oxford, Guildford, &c.* hath considerably added to the Husbandry and Trade of those Towns, and lessening humane Labour within these few years. The use of Waggon instead of Pack-Horses, where they could be used, hath much abated the price

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of Carriage. The use of Stage-Coaches hath likewise given a greater liberty for People to travel through most of the great Roads of *England*, to the great encrease of Trade. And the Womens use of *Pattons*, a seeming inconsiderable Invention, hath saved the wearing of a great deal of Leather, whereby there hath been much the more of it to be spared for Exportation wrought or unwrought. The *Saw-Mill* on the *Thames-Bank*, hath, by the force of the Wind, done the work of many hands, which is much to the Public advantage. The great like would any Instruments beget that could but lessen the labour of Man or Beast.

If all our Corn were to be beaten in Mortars, as in *Hesiod* time

time, instead of being ground in a Mill; and all our Wares, Goods, &c. carried from place to place on Horse-back, as in some places now it is instead of in Waggon or Carts, and all the Water carried from its Fountains to the respective houses in or near London, as for the most part it was before the *New-River* was made, and the various Engines erected to convey it from the *Thames*; on what a vast number of People and Horses must be then employed?

It is true, it would maintain a great number of People, and beget a very great private Trade to some People in some places: But would very much lessen and impoverish the Trade of the Kingdom in general.

Here it will be objected, that heretofore before many of these new Inventions, we had a great foreign Trade. To which I will only answer, That then our Neighbours were not so ingenious, nor so much addicted to Trade as now they are; for had not we hitherto kept pace with them in Ingenuity and Industry, they had long since devoured our Foreign Trade: Therefore as they thrive, we must emulate them. For Divine Providence hath seated us on an Island yielding all sorts of Necessaries, Mineral, Animal and Vegetable, for the promoting and carrying on of Trade: Having many secure Ports for the encouragement of Trade. And its temperature of Air and situation on the Globe such, that it exceeds all

all other places whatsoever yet discovered: That if its Husbandry be neglected, and its Trade decayed (which necessarily follows) it must very much reflect on the *Genius* of its Inhabitants, which to do, there hath been hitherto no cause: No Nation under the *Sun* producing so *Industrious, Active, Valiant, and Wise* a People for the Management of their Trades and Occupations at Home, and spreading their Colonies and Factories, and multiplying their Effects abroad.

One of the great Advantages to Husbandry and Trade of *England* is, that there is not a Vill in it but is situate within 20 Miles of the Sea, or some River Navigable, or that may be by Art and Industry so made, whereby

carriage of heavy Commodities useful in Foreign or Domestic Trade may be cheap: As Timber, Stone, Coal, Corn, &c. which not only easeth the labour of many Hands, sparing them for other uses, but the better furnisheth all Markets with such Commodities they want of their Neighbours.

Therefore the cutting and making of Rivers Navigable, is very much to be encouraged, as of Public Use and a National Advantage, and so hath it been esteemed in Foreign Countries: The Navigation on cut Rivers advancing the Trade of many rich Cities and Towns in the *Spanish Netherlands*, and *united Provinces*, usually called *The Low Countries*. And great have been

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the Attempts of Emperors and Princes abroad in cutting Channels, uniting of Rivers, &c. As in cutting a passage between the *Mediterranean* and the *Red-Sea*: The making Navigable the *Isthmus* of *Corinth*, thereby to make safe and speedy passages from one Sea to another. Attempts have been likewise made to unite great Rivers, as the *Loire* and *Seine* at *Briare* in *France*, the *Soane* and the *Mosella* on the Confines of *Burgundy*, and the Rivers *Redintz* and *Altmul* near *Regensburg* in *Germany*, began by *Charles the Great*, which had it been perfected, would have opened a Navigable Passage from the *Rhine* to the *Danube*.

But the greatest Work that hath been attempted and performed,

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formed,

formed, is the cutting the *Royal Canal* of *Languedoc*, making a Navigable passage from the *Pont* of *Cette* on the *Mediterranean Sea* into the *Garonne*, which emptieth it self into the *Western Ocean*, which is esteem'd not only the greatest and most stupendious Work in *France*, but of the whole *World*. It was first propos'd by *Cardinal de Richelieu*, began in the year 1668. and carried on with great Skill, Cost and Industry, and finished Anno 1686. The length of the *Canal* is said to be 50 or 60 *French Leagues* in length, and in breadth 12 or 15 fathom, that Vessels of good Burthen may pass easily; its depth about 8 or 9 Feet.

This *Canal* hath its supply of Waters from several Rivers by other

other *Canals* made to convey them into this *Channel* of Communication between the two Seas. Besides which there are great *Treasures* of Water coming of other *Streams* of *Rain* and of *Snow*, reserved to supply any defect of Waters that may in times of Drought happen in the *Royal Canal* or *Channel* of Communication: This *Canal* is also carried by a Stone-Bridge over another Navigable River; and in another place it passes through a Hill in an arched passage of 26 fathom in length: In this *Canal* are said to be 23 *Locks*, all of Stone-Work, for the raising of the Vessels, I suppose as they pass from the *Mediterranean* towards the *Garronne*; for it is to be supposed that the Sea at *Cette* or *Mont-*

Montpelier, is equally or very near level with the Sea below *Burdeaux* at the Mouth of the *Garonne*. And it is evident, that the *Garonne* from *Tholouse* runneth at least five times farther than is the distance between it and the *Mediterranean-Sea*; and the *Garonne* is upon a continual descent, and because there is a sufficient supply of Waters, Vessels may pass without help of *Locks*: But the *Royal Canal* having only Water to preserve it full, must be made level, and its descents towards the *Mediterranean-Sea* must be by Artificial *Locks*, and in number as is their depth, and the declination of the Country. By this *Canal* may be transported all Commodities from the *Mediterranean-Sea* to *Burdeaux*, and all
that

that Coast of *France*, and so by consequence to the Northern parts of *Europe*, without the hazard of passing the Streights of *Gibraltar*, or fear of *Turkish* Pirates, besides the easie carriage of *Wines*, *Corn*, *Oil*, &c.

I only mention this particular Work, to shew that great things may be accomplished, where *Interest*, *Honour* or *Glory*, excite great Men to aid and assist in such Enterprizes.

We have here in this Kingdom some Instances of extraordinary Actions of this Nature, which have been formerly done to the Honour of the Undertakers, and very much to the Advantage of the places where they have been done, and consequently to the Nation in general: As the making
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the River of *Thames* Navigable from *Abington* to *Oxford*, and then farther towards *Lechlade*, hath proved of very great Advantage to that *City* and places adjacent. The like the making the River from *Gilford* in *Surrey* into the *Thames* Navigable, hath been very advantagious to that Town and its Neighbourhood, and both of them have added much to the Trade of that Famous City of *London*.

There was once a Navigable *Canal* cut from the River *Trent* near *Torksey* in *Lincolnshire* to the City of *Lincoln*, where it joyned to the River that flows from thence to *Boston*, and was supplied with Water from that River: It was said to be done by Bishop *Attwater*, or *Henry 1st*, as some will

will have it. However it was an ancient Work, as its Name imports, being called *Fossedike*, and is visible to this day, although wholly useless, perhaps suffered to decay by reason the Advantages arising thereby might be but small, *Trent* and *Boston* being neither far from *Lincoln*, or perhaps when the Trade of that City decayed (which hath been heretofore very great, as hath been said) this *Canal* was neglected.

But the greatest Work of this Nature that hath been done in this Age in this Kingdom, was the cutting that famous *Aqueduct* from *Ware* to *Islington*, whence by Pipes its Water is conveyed to the greatest part of *London* and its Suburbs. A Work not only eternizing the Fame of the Undertaker

Undertaker, but of infinite advantage to his Successors and that great City.

It is not impossible so to enlarge it as to make it Navigable for Wherries and slender Barges, for the passage of Men and Women, and the easie carriage of all manner of Commodities to the Markets of that great *Metropolis*, and the return of Coals and other Goods back again. For there is Water enough in the River *Lea* at *Ware* to maintain a full Channel all the year, to carry Vessels of good Burden, and to maintain currents of Water in most of the principal Streets of the Famous City of *London*, which would not only keep them clean and wholesome, but be ready on all occasions, if sudden Fires should happen.

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There are many other *Rivers* that either flow into the *Thames* or other (already made) *Navigable Rivers*, or into the Sea, that may be made Navigable, to the very great advantage of the adjacent Towns and Countries, and of the general Trade of the Kingdom. For it is most certain, where there is Water enough to make a full *Changel*, and supply the constant Expence and Leakage of the Locks, the making of such River Navigable will be feazible, notwithstanding the descent or fall of the River be quick: For where the descent is quick, as from *Salisbury* to *Christ-Church*, and from *Winchester* to *Southampton*; although there be plenty of Water, yet it is usually broad and shallow, and therefore not naturally

naturally Navigable, nor to be made so without many *Locks* and artificial *Canals*; for the Current will otherwise be so strong, that laden Vessels are not easily haled against it: Such Rivers require too much cost for a private Purse to undertake to advantage. But if there be Water enough, as in many Rivers in *England* there is, and the descent not too quick, *Locks* will raise Vessels into the new-cut *Canals*, through which, although heavy laden, they will pass with ease. It is observed, that the Water descends from *Brussels* to *Antwerp*, above 200 Foot, yet is that River Navigable by the help of *Locks*: And that at *Fontain*, four or five miles from *Brussels*, one River is by Art carried over another for Navigation

Station-fake. It's the easie carriage of Goods from one place to another that makes so many and rich Cities and Towns, and Trade flourish in those Countries, and without doubt would do the same here.

It is not the setting down the Expence of making a River Navigable, and then setting down the Income of the Toll, and so casting up, Whether it will bring in as much *per annum* as the Interest of the Mony to be expended amounts to, that will make Rivers Navigable. If those Expences had been rightly cast up, the River from *Ware* to *Islington*, and that from *Guildford* to the *Thames* had not been yet begun: Although there be twenty times the Interest of such Expences advantage to some or other, besides the

Public. Therefore such great Undertakings where so many are concerned in the Profits, ought to be at the Expence of many: As the Reparations of some High Ways, Bridges, Havens, &c. have been at the Charges of more than the adjacent Inhabitants, because the Profits extend farther.

It hath been a long time under Consideration, and several have pretended to be Undertakers of it, viz. The Uniting of the River of *Thames* with that of *Avon* that flows to *Bristol*, making a Navigable Communication between the Cities of *London* and *Bristol*. The possibility of accomplishing this Enterprize hath been much argued, and I will not here contend against it, supposing the same may be done, so that there be Water enough to supply such

a Na-

a *Navigable Canal* that must be
 made between the Heads of two
 small Streams that lead to each
 River, which will be very difficult
 to be had, where there is no other
 Stream or River near, to be
 brought into it, to supply it. For
 it is not a little Water that must
 maintain such a *Navigable Chan-
 nel* in the Summer-time, and the
 Leakage of the Locks at each
 end, which must be for raising
 up and letting down of Vessels,
 that ought daily to pass through
 this *Channel*; and in case there
 should be a constant supply of
 Water, yet would the Expence of
 making so many Locks as would
 necessarily be required on those
 small Streams, be so great, that it
 would be insupportable, or at best
 very unprofitable to private Pur-
 ses. For a small Stream hath a
 much

much quicker descent than a large and heavy River, for this worketh it self into a level, there being not so great a descent from *Kingston* upon *Thames* to the shore at *Putney*, as is usually in a miles length of a small River; besides small Waters are incapable of Navigation, unless pent up to a level. But without doubt if this Work were done (in case it be possible to be done) it would be of very great use and advantage to all that Trade between those two Cities, and an enriching of several Countries adjoyning to the said *Channel*, as well in their Husbandry as Trade.

The making of Rivers Navigable being at the first, a Work of great Expence, is too much for private Undertakers: Therefore if there were a Fund of 20 or

30000

30000 *£* *per annum* raised out of
 some foreign Commodity, or on
Coals, or the like, to be applied
 for that purpose, In a few years
 time many Rivers in *England*
 might be made Navigable, where-
 by *Coals* and other Marine Com-
 modities might be imported to;
 and Timber, Wood, Stone, Corn,
 &c. be exported from the more
 Inland-parts; and a small Imposi-
 tion on each Barge or Vessel
 would be sufficient to maintain
 the Locks and Canals in repair;
 which would prove a very great
 Incouragement to Husbandry
 and Trade: As appeareth in all
 places situated near a Navigable
 River, where Farms yield good
 Rents, and yet plenty of all things
 abounds: That all places may
 partake of the like Felicity, is the
 desire of all true *Englishmen*.

The

The *Analysis* or Summary of this Second Part of the Mystery of HUSBANDRY.

THe Preface or Introduction, shewing the great advantages that Husbandry bringeth to Trade, and the dependencies the later hath on the former

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CHAP.

CHAP. I.

Of Husbandry and Improvements in general; plainly discovering that there is a spontaneous generation and growth of Vegetables and Animals.

IN my former Treatise of this Subject, and the first Chapter, I discoursed somewhat of the Matter or Essence of Vegetables, from which they receive their substance, That inexhaustible Treasure from which the Husbandman, by a proper application of his Seed, extracteth so great Riches: I will now make some small addition to that Chapter, in opposition to an Assertion sometimes made; which is, That every Plant

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is

is propagated by its proper Seed ; And,
That Nature produceth nothing spontaneously.

*That there
are spontaneous
productions
of Plants.*

Now what can be more plain, Than
that every part of this Globe of Earth
(where the perpendicular Rayes of the
scorching *Sun*, or the defect of those attracting
beams in the *Frigid Zones*, or
the great quantities of *Egyptian* or *Lybian*
Sands prevent not,) affords its larger
Forests, Woods, Groves ; Or its lesser
Shrubs ; Or its fertile Plains, replete with
great variety of small Vegetables, some as
Medicines, others as Poysons, some as
Food, others as Rayment to their respective
Inhabitants, and for Pasturage to
the numerous Herds and Flocks of Cattel
and other lesser Animals feeding on them,
without being planted in such places by
Humane Industry, or the Seeds transported
in the Air to so remote parts. The
Western Islands also that lie remote from
the *American* Continent, although uninhabited
by Humane Race, yet afforded
to the first Discoverers large Woods and
fruitful Pastures, which fed our European
Cattel when put on shore, and on which
they multiplied and prospered exceedingly ;
such Vegetables that were so far
from

Improvements in general.

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from being propagated by Seeds carried
thither in the Air, or by any other means,
that the Species of some of them are not
to be found in other Countries.

The Histories of the first Discoveries
of the Western Continent, and the Islands
remote from Land on every side, will
furnish you with variety of Examples of
this nature.

Besides, there are many Plants that are
spontaneous only at certain Seasons, and
not at other, according as the Recepta-
cle or Matrix of the Earth is enclined ;
For sometimes over-much moisture, in a
wet year, causeth Land to emit other
Plants than before it did in dry years; and
the laying of dry Land wet, or wet Land
dry, very much altereth the Species of
Vegetables that spontaneously proceed
from it.

Mr. *Evelin* in his Philosophical Dis-
course of Earth, gives an account of
what Dr. *Morison* affirmed of the Plant
Erysimum or *Irio*, that after the Conflagra-
tion of the City of *London*, more of it
appeared amongst the Ruines, than was
known to grow in all *Europe* besides: It
being (as he saith) a curious *Exotic*, to be
found

found most about *Naples*, and but rarely elsewhere.

Examples of this nature are many where after the felling of one sort or Species of Wood another hath succeeded and where Land that hath been frequently sown with one sort of grain, hath produced other grain than what hath been sown.

The same Mr. *Evelin* in his most excellent *Discourse of Forest-Trees*, relates from a Person most worthy of Credit, That in the Territory of *Alzey* (a Country in Germany, where they were miserably distressed for Wood, which they had so destroyed, that they were reduced to make use of Straw for their best Fuel,) a very large Tract being newly plowed, but the Wars surprizing them, not suffer'd to sow; There sprung the next year a whole Forest of Pine-Trees of which sort of Wood there was none at all within less than fourscore miles.

Some assert
that all
Plants are
produced
of Seeds.

Many other Relations there are in *Pliny*, and other Authors of the like nature, which I need not mention; Only here I cannot but take notice of the far fetch't Cause of such unexpected productions of Vegetables some have given

viz.

viz. That because God said, *Gen* 1. I have given you every Herb bearing Seed, and every Tree in the which is the fruit of a Tree yielding Seed: Therefore all Vegetables are produced and multiplied of the seed of the same Species, and by no other ways, and deny all spontaneous Productions. And to back this Assertion, have found out a way whereby the seeds of all Vegetables may be conveyed from one Country to another, viz. by the Wind, from whence their Species may be renewed or propagated *de novo* in places where formerly they have not been known. And imagine that the Showers of seeds mentioned by *Pliny* in *lib*. 16. cap. 33. & *lib*. 19. cap. 3. were first exhaled from Trees or Plants of the same kind; and to make this seem more probable or easie to obtain Credit, they have discovered that there are several Plants that produce seed, which formerly were reputed barren; and those seeds so small that with the Wind they may easily be transmitted from place to place at a very great distance, whereof *Mr Hooke*, *Fellow of the Royal Society*, in his little Tract, intitled *Lampas*, gives you some instances. As that Observation of his own about

the seed of Moss, which with his Microscope he found to be very numerous and very small, that there will need no less than nine hundred and threescore thousands of them to cover the superficies of an inch square; and that the number of them in a grain weight cannot be less than one thousand three hundred eighty and two millions: These seeds he supposeth may easily be drawn up into the Air, and carried from place to place, even to the tops of the highest Towers, or to places most remote, and be sown by the passing Air, or falling drops of Rain; and that it is not in the art of Man to leave Earth exposed to the common Air, and to exclude the entrance, or prevent the sowing of these imperceptible Seeds.

Another was an Observation of Mr. W. C. of Bristol about Fern-seed, which he found to be likewise very small, and numerous, and that the little Boxes containing the feeds were in most of the Plants not half, and in some not above one third, or one quarter as big as a very small grain of common white sand; and that some of those bladders contained about 100 seeds, which were so exceed-

ing

ing small as to be wholly invisible to the naked Eye, and indiscoverable without a Microscope.

I will not gainsay these curious and ingenious Observations, nor question them. But these do not at all manifest that all Plants are produced of seeds taken from the same Species. For how could the Wind carry the heavy, though small seeds, of Purslane from the Continent above 1000 miles over the Seas to the Island *Sancta Helena*, where at the first discovery thereof it plentifully grew; and the seeds of the *Cedar* from Mount *Libanus*, or any other Continent, to the Island of *Bermudas*, where so great Woods and Groves of it were found at its first discovery? Or how could the Seeds of the various kinds of Grass be wafted over so large Seas into all places, almost throughout the World, by the Air only? For although the seeds of them are but small, yet have they their weight; and notwithstanding they may by Hurricanes, tempestuous Winds, or the like, be elevated to a great height in the Air, yet have they a tendency towards the center of the Earth, and cannot long remain at such a distance, as to be trans-

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mitted

mitted from one Country to another, nor indeed is there any necessity thereof: For although every Plant may yield its seed by which it may probably encrease, yet that is no reason but that every soil may spontaneously produce some Vegetable it is most inclinable to. As some Seas yield *Coral*, some one sort of Weed, some another, the like of other Waters; likewise some Plants yield one sort of Excrecence, and some another, which cannot be imagined to proceed from material seed, no other than the variety of Mushrooms, Mold, &c. which differ according to the nature of the soil, or the several subjects from whence they grow, these rather proceeding from the universal Agent, as it is more or less animated by the Celestial Sun, and as it meets with its proper Matrix, so it produceth some Plant or other. Now the use the Husbandman may make of these natural and spontaneous productions, is, that by them he may discover the temper and strength of the ground that produceth them, that he may either multiply the same Species, if for his advantage, or such other that are consimular, or avoid planting or sowing in Land of a contrary nature.

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Quæ robora cuique,
Quis color, & quæ rebus natura ferendis,
Humida majores Herbas alit,

Piceæ, Taxique Nocentes
Interdum, aut Hederae pandunt Vestigia
Nigræ. Virgil.

For it is observ'd that where Brambles flourish, the Vine will prosper; and that Land natural to the Birch is not good for Apples, Pears, &c. That Tree delighting in the lightest and poorest, these in richer and stronger Lands. Many of the like Observations may the Husbandman make of the nature of his ground, and accordingly may he apply proper seeds or plants to the same.

It hath been also asserted, That no Animals are produced but by the act of Generation, each proceeding from others of the same Species. But if they that are of that opinion do consider that there is no habitable place on this Globe that is not replete with Animals greater or lesser, and some places with both, notwithstanding it doth not appear how the first of them came thither; They will easily grant,

That there
are Spontaneous
productions
of Animals

grant, that the same universal *Agent* or *Spiritus Mundi* that never resteth, may when it meeteth with a proper subject cause Animation, as the matter is whereon it worketh ; for some places or things being less prolific or fertile are apt to Vegetation , others that are more, are apt to Animation or the production of Animals by the power of the same Agent. As moist and fruitful seasons and places yield more Insects than dry and barren. And standing Pools and mature Fruits naturally afford small Animals, which never were generated by others , but only by the Universal Agent. Many instances hereof might be given ; for almost every Plant produces some Insect or small Animal proper to that Plant : As the Mulbery, the Silkworm, Apples, Pears, Plums, &c. Worms peculiar to these Fruits. Nuts also have Worms within their shells there generated by the same natural heat or spirit that produced the Kernel, and not from any external seed or Egg ; for that Worm worketh its own way out of the shell, and then ceaseth to be.

Mr. W. C. (that before gave an account of the Fern-seed) to the admiration of him,

him, and others with him, observed many differing kinds of small living Creatures wholly invisible to the naked Eye, and even through largely magnifying Spectacles, though some of them were to be seen through a deep convex Glass; but with a Microscope, when the Plant was newly gathered, they might be seen nimbly running up and down among the seed Vessels. *Lampas p. 50.*

Perhaps it will be said that these Animals are produced of Eggs repositied there by some small Flyes, as the proper place or Matrix for their production; as Flesh-flyes do the like on putrifying flesh. But why may they not be there engendered by the universal Agent as well as Mites in Cheese, or those nimble Fishes in Vineger, which are never observ'd to be transformed into Flyes, and so incapable of transporting their Eggs from place to place?

This supposition of the spontaneous production of Animals out of places and things capable of impregnation from that universal Agent, is not contrary to, but agreeable with that Command, *Gen. 1. Let the Earth bring forth the living Creature*

Not contrary to the Scripture.

ture after his kind, Cattel and creeping thing. To which we will subjoyn the Opinion of the Learned Dr. *Stillingsfleet* in his *Origines Sacrae*, Book 3. cap. 4. "It seems very probable (saith he) that "at least those parts of the Earth which "were thus divided from each other, did "bring forth these several living Creatures after their kinds, which did after "propagate in those parts without being "brought thither by the help of man. If "now this supposition be embraced, by "it we presently clear our selves of many "difficulties concerning the propagation "of Animals in the World, and their "conversation in the Ark, which many "have been so much to seek for satisfaction in. As how the unknown kind of "Serpents in *Brazil*, the slow-bellied "Creature of the *Indies*, and all those "strange species of Animals seen in the "West-Indies, should either come into "the Ark of *Noah*, or be conveyed "out of it into those Countries. And afterward the same Author adds, "Besides, some kind of Animals cannot "live out of that particular Clime wherein they are; and there are many sorts "of Animals discovered in *America*, and "the

“ the adjoining Islands, which have left
 “ no remainders of themselves in these
 “ parts of the World.

Therefore let them that are so confidently opinionated, That every thing we discern to have life, proceeds from an Egg; consider from whence these Multitudes of *Locusts*, *Grashoppers*, *Caterpillars*, *Frogs*, *Chaffers*, &c. that in some years and in some Countries do appear, although at such remote distances of time, that in case they were produced of Eggs left in the Earth by some former flight of those Insects, it will prove very difficult to demonstrate how life could be preserv'd in such Eggs so many years; or else how the Wind could carry them from one Country to another, or out of different Climates; or how the Eggs of Insects could be conveyed into *Nuts*, *Fruits*, *Woods*, *Stones*, &c. which frequently afford those Animals: Nay, Snow it self is said not to be without its proper Inhabitants, although there be sometimes two or three years interval between any quantities lying in these parts.

The Bodies of Men and Beasts afford many Examples of Worms bred in the most inward parts, even in the Brain and
 Mar-

Marrow of the Bones. But where they lay their Eggs, and how they should be convey'd from one to another, will be difficult to determine. Therefore when I consider of the many instances of this kind that may be produced, and the difficulties on the other hand, I am the more confirm'd in my opinion, That there is scarce any created being that hath any thing of moisture in it, but may be a proper Matrix for the *universal Agent* or *Spiritus Mundi* to act upon for the production of some Animal; and according as Plants are (from some superior influence) more corrupted, so do they emit greater numbers of some sorts of Animals or Insects, that they become a Scourge to the Husbandman, whose knowledge of these things is not unnecessary, that he may use means to prevent or cure such Plagues. The prevention and cure whereof in the Tenth Chapter of the former Treatise is partly treated of.

C H A P. II.

*Of the great benefit and advantage
of Enclosing Lands.*

IN the former Treatise in that Chapter of this part of *Improvement of Lands*, I gave an account of the great advantages Enclosure would produce, and the many Objections raised against it, and Impediments that hindered it, with their Answers and Removals. Since the writing whereof, several worthy and ingenious Men have endeavoured to promote this Piece of Husbandry, which I may truly stile, *The first and principal Point of Agriculture*; For unless the Husbandman can at all times and seasons, when he pleaseth, use his Land, and plant and sow in it what he will, and defend it when he hath done, from the common annoyances to good Husbandry; It is in vain for him to use any extraordinary labour, or be at any extraordinary expence, or hope for any advantage from it. So that there would be then no difference

ference between stupidity and Ingenuity, and all Industry would be hereby discouraged.

Profits of
Enclosing
Lands.

Some have been of Opinion, that Enclosing improves Land to a Ten-fold, others to a twenty-fold advantage; that is, that by the means of Enclosure the Husbandman may by his Industry on such Land, in planting several Hortulanes or Orchard Fruits, raise aswel to the Public as his own advantage, much more than he could on open Land seldom fruitful, and subject to almost all manner of inconveniencies, as Cicero says, *Ager quantumvis fertilis, sine cultura fructuosus esse non potest.* There is no Country that is celebrated for good Husbandry or Ingenuity in our temperate Clime, but their Lands are divided into severals, as the rich Provinces of the *Netherlands*. The most fertile parts of *France* and *Italy*, the Garden of the World, sufficiently evince. Nor is there any place in this Kingdom flourisheth more than where Enclosures are most. The open Champain Countries and wast Lands producing multitudes of poor, ignorant, lazy and improvident people, depending so much on the

small

small Priviledges and Advantages they raise out of the large Forests and wast Lands, that Hunger and Cold for the most part of the year, and Ease throughout, are sweeter to them, than Labour or constant exercise in some honest Trade or Husbandry, which might lodge, cloath, and feed them and their Families, after a far better manner than the best of such Borderers ever enjoy'd.

For any Traveller may observe that in the enclosed Countries, the Hedges are all replete with Timber and other Trees, that they are deservedly called *The Wood-Lands*, and were so called in former Ages: And not only with Timber for building, and Trees for firing, but with plenty of Fruit-Trees in the Hedges and Orchards dispersed throughout, so that these enclosed Countries afford Fruits which are carried far into the Champion, and Cider in such plenty, that they spare great quantities for their ignorant and lazy Neighbours. The Buildings also in these enclosed Countries, where Materials and Artificers are more plentifully to be had, far exceed those in the Champion and Forest-Lands; and Market-Towns well built and populous, standing much nearer

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here

here than in the other. All sorts of Mechanic Trades, on which the General Trade of the Kingdom depends, are in these enclosed Countries principally managed. Here are the industrious Husbandmen constantly employed in improving their Lands, and here are Markets where in they weekly vend the Fruits of their Labours, to the feeding and sustaining the Artificers and Trades, who best subsist in such places, where most is to be had at the easiest Rates. Now hear old *Tusser*;

More plenty of Mutton and Beef,
 Corn, Butter and Cheese of the best;
 More Wealth any where (to be brief)
 More People, more handsom and prest;
 Where find ye (go search any Coast)
 Than there where Enclosure is most:

Objection.

There is one grand Objection raised by inconsiderate Men against Enclosures; to wit, That Enclosing of *Wasts, Downs, &c.* will prove a decay of our Herds of *Cattel*, and Flocks of *Sheep*, and so by consequence, of *Wool*.

To

To which I answer, That if 20 *Cattel* must have 100 or 200 Acres of good waist Land, or that 2 or 300 *Sheep* must have 5, 6, or 700 Acres of open *Down-Land* to depasture on, according to the present use and custom: In case so much thereof be enclosed as lieth convenient for Enclosure, half the quantity of such open Lands being laid up to common Grass, will feed more than the whole did before it was enclosed. And in case that ten Acres thereof so enclosed, were sown with *Clover-Grass*, *Turneps*, *Cole-Seed*, *Parsley*, or the like, they will feed as many *Cattel* or *Sheep* as 100 Acres of the same Land would have done whilst they were waist; and the residue may the Husbandman convert to other uses, or multiply his Herds or Flocks therein as he pleaseth, and in his several Enclosures may he raise several Species of Pasturage, some for fatting, some for feeding, and others for preserving his *Cattel* or *Sheep* in health, as he finds cause. For the only reason why there is so great a breed of *Cattel*, and are such great Flocks of *Sheep* on the Waists and Downs, is, because they are not convertible to any other use,

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use, or else the Husbandman is not suffered so to convert them; it being frequently observed that where the Lords will permit, the Tenants are ready, and do Till and Manure much open Lands; notwithstanding which, neither *Cattel*, *Sheep*, nor *Wool*, are any whit the dearer.

CHAP.

C H A P. III.

*Of Meadow and Pasture Lands, and
the several ways of their Im-
provements.*

THe ancient Meadow-Lands in many places of this Kingdom have not born the same values within these late years as formerly they did, by reason of the encrease of that excellent and profitable part of Husbandry, the sowing of *Clover-Glass*, and other such like new Grasses and Hays: Yet are Meadow-Lands in great esteem, and yield greater Rents than Pasture or Arable; because of their producing Grass and Hay, as is known to every Husbandman, and that they yield their encrease spontaneously, without Cost or Labour; and therefore are called *Prata, quasi parata*. *Pliny* tells us, *Pratorum facilima agricolis cura ac minimi dispendij*, That Meadows require the least Care or Costs of any Lands; and therefore little can be said to their Improve-
ments,

ments, more than hath been said already.

*Improve-
ment of
Pasture-
Lands a
double Im-
provement.*

But as to the great Improvements made on dry Lands, by the sowing and propagating of new Grasses and Hayes, much hath been done, and the advantages that are yet to be made by a farther prosecution of that piece of Husbandry, are very considerable. For the encreasing of Meadow and Pasture-Lands is not only the Improvement of those very Lands; but by the Country-mans converting of so much Corn-Land into Meadow and Pasture, puts him upon a necessity of a farther improvement of more barren Lands for an encrease of his Corn. So that it proves a double improvement, as indeed doth all Improvements by altering the products of it. As converting of Pasture-Lands into Gardens, Orchards, &c. begets a necessity of encreasing our Pasture-Lands on the Arable: And the converting of Arable Lands into Pasture or Meadow begets a farther Improvement, by reducing our naked and wast Lands into fertile Corn-Fields: For where there is good Husbandry at the Center, it spreads to the
Super-

Superficies ; Good Tenures, Good Trade, and a good Market, will make Husbandmen ingenious.

Amongst the several Grasses, Hays, &c. that have been mentioned by former Writers on this Subject, we do not find that Parsly hath been treated of as an Improvement to our Pasture-Lands, although some ingenious Men have made trial of several Acres sown with Parsly-Seed to very good effect.

Sowing of Parsly an Improvement.

It is observ'd, that some sort of Grasses do alter the tast of Mutton, and that the sweetest Mutton is that which hath been fed on the finest and sweetest Grasses, as is experienced on the *Peak* in *Derbyshire*, and on the *Plains* in *Wiltshire*, *Hampshire*, &c. And on the contrary, the coursest Mutton is produced from the grossest Meadows, Marshes, &c. which later rich way of fatting Sheep, is most advantageous to the Husbandman, but doth not humour the Pallat of the Eater, so well as such Beasts that live on the dryest Mountains without water. For Sheep fatted on Clover, and the like rich Nourishment, are not so delicate meat as the Heath-Croppers ; such rank feed be-

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getting

getting too great and sudden a change in the Meat. The like difference is also observed in Conies.

*Sheep fatten
in Turneps.*

Sheep fatten very well on *Turneps*, which prove an excellent Nourishment for them in hard Winters, when Fodder is scarce: For they will not only eat the Greens, but feed on the Roots in the Ground, and scoop them hollow even to the very Skin; The *Turnep* is of hotter nature than *Clover-Grass*, and therefore more agreeable to these Cattel,

*Parsley
prevents
the Rot in
Sheep.*

But much more hot and drying is *Parsley*, even in both, to the second degree; and were it thoroughly experimented; doubtless would prove very good Nourishment, and not subject those dry Animals to the *Rot*, nor vitiate the taste of their Flesh so much as the other colder Food would do.

The *Rot* being a Disease occasion'd by the *Sheep* their feeding on too much cold and moist Meat, and is prevented by hot and dry: As their feeding in shady places in some Grounds, where the Dew lieth long on a certain broad *Grass*, naturally

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naturally enclineth all *Sheep* feeding there; to the *Rot*; and by such that have to their Cost made experiment thereof, such Lands have been converted to other uses: When on the contrary, the feeding of *Sheep* on *Salt Marshes* and *Brackish Grounds* preventeth the *Rot*, and the giving them *Salt* with their dry Meat, is esteem'd a Cure of that Disease.

Therefore *Parfly* (being of such a *hot*, *dry*, *saline*, and *Anti-Hydropical* nature, and as my Relators assure me) so much desired by *Sheep* (as I am sure it is of *Cornies*, much of the nature of *Sheep* in respect of their feeding) may very probably be, not only a very good security against the *Rot*, but may render the Meat rather better tasted than any other food what soever.

And it is a Plant very easily propagated, and the Seed plentifully obtained; few Plants yielding more, and that also easily separated from its Stalks: The Ground the finer it is dressed, the better will the *Parfly* sown therein grow and prosper; and it will endure the hardest *Winters*, and continue more than one year; but how many, a careful Improver will quickly discover: And of what particular

particular Uses and Advantages this Piece of Husbandry may prove (besides the general way of feeding Sheep) an ingenious Husbandman will soon find out.

Improvements by
Cole-Seed.

The sowing of Cole-Seed for the sake of the Seed hath been always esteem'd a great Improvement of strong and moist Lands. But of late it hath been found that the depasturing the green Herbage thereof hath considerably advantaged the Husbandman. A particular Example whereof is related in Mr. Houghton's *Collection of Letters, for the Improvement of Husbandry and Trade, viz.* Of one that sowed six Acres of ground which he ploughed and ordered as for Wheat, with *Cole-Seed* about *Midsummer*; about the beginning of *November* he put an hundred Ewes into his *Coleworts*; The Ewes all cast their Lambs before *Christmas*. The *Coleworts* so fed these Ewes and Lambs, that he sold them at a great Rate, and when the growth was eaten up close, he plowed and sowed his Lands with Oates, and had eight Quarters grown on every Acre.

To sow *Cole-Seed* for the Pasture-sake there's no need that the Land be so rich and

and moist as if it were for Seed, only that it be good Wheat-Land. It maketh a good Lay for other beaten Grain; for undoubtedly it kills Weeds, and the depasturing Sheep on it much meliorates the Land. That which is sown about *Midsummer* for Seed, gives you not its increase till the next *Summer*, but this the first *Winter*. These Improvements of Pastures by *Parsley*, *Turneps*, *Cole-Seed*; nor that by sowing and feeding of Buck-Wheat, mentioned in the Fourth Chapter of my former *Treatise* of this Subject, are not yet brought into publick use; but may prove very advantageous to the skilful and industrious Husbandman, and consequently to the Kingdom in general.

C H A P. IV.

*Of Arable Land and Tillage, and of
the several Grains, Pulses, &c.
usually propagated by the Plough.*

*Mowing
of wheat
in the
Grass.*

IT hath been observ'd, that in a warm and showry Spring, Wheat in rich Lands hath grown exceeding Rank, that the Husbandman hath, for the benefit of his Wheat, early in the Spring, depastured his Sheep on it to abate its growth and weight, which otherwise would be apt to lodge. But of late some (who have found that expedient too weak, where the Wheat hath grown too fast, or that they have not had Sheep enough proportionable to their large Wheat-fields to feed it down) have mow'n their Wheat, yea as late as the end of *May*, when it hath been almost ready to Ear, after which the Roots would emit new Stalks more in number, though not so strong and rank as the former, nor so apt to lodge. For the extream weight and rankness of the Corn would have un-

unavoidably made it to lodge, which begat a necessity in the Husbandman to try this way, else he might have lost his whole Crop; for Wheat lodging when it first begins to shoot its Ear, rarely ever stands again. Many in the rich *Vales* of *Berk-shire* did so mow their Wheat in the Year, 1683. it proving an early and showry Spring: As to the effects I had no account of them; which I question not but that they were answerable to their Intentions: For all Vegetables tend to semination; and the more you depress or take off the first shoots of any Fruit or flower-bearing Plants, the more will they multiply their proper Productions, or at least will emit new Blossoms, Fruits, Flowers, &c. As hath been observ'd in many *Hortulanes*, as *Roses*, *Strawberries*, *Beans*, &c.

There are divers sorts of Wheat Rash-ripe
which I have mentioned in my said former *Treatise*, and more are since taken Barley.
notice of; of which there is one sort that carries divers Ears on one Stalk, but not yet common. But of Barley I hear of few more than two sorts: The common which is universally known in this Kingdom,

Kingdom, and that called *Patney* or *Rathripe Barley*, which is sometimes sown in *Wilt-shire*, *Berk-shire*, *Oxford-shire*, and some part of *Cornwall*, and in few places else, notwithstanding the advantage of its early ripening, it having many times been sown and returned to the Bar again in two months time, always in nine or ten weeks time at the farthest, which in wet and backward Springs, and most Autumns, must needs prove a great advantage to the Husbandman. For in some years a very dry Spring may postpone the Season for sowing this Grain, or a man may not have time, without a double strength, to sow the common Barley before the Season for that be quite spent; or the former part of the Harvest-time may be fair, when the later is foul; in either of these cases the sowing of this quick growing Barley may be considerably advantageous; or at least that where a man hath much Land in his Occupation fit for this kind of Grain, he may, instead of making his Seed-time and Harvest near about a time, for this common sort, use so much of this *Rathripe Barley*, that his Seed-time may be longer and more easie, and his Harvest the

the like, and withall more certain. There is a sort of *Barley* that is reported to be newly discovered, by an ingenious mans accidentally lighting on an *Ear* that had six Chests or Rows of Corn on it, which he sowed, and thereby raised a quantity, all bearing the like *Ears*, which is likely to prove a considerable advantage.

Whilst we are now discoursing of *Barley*, it will not be amiss to say somewhat concerning *Malt*, that being the most considerable Grain used for this purpose. Many Ages since hath *Malt*, made of *Barley*, been used for the making of Ale or Beer; else could not *Pliny* have given so great Commendations of this Drink above 1600 years since. Therefore whoever he was that first found the Art of making *Malt*, and (of that) good *Ale*, shewed himself to be a far greater Philosopher, than he that first squeezed the Grape.

Making of Malt.

Although that making of *Malt* is become a common Trade in most of the principal *Towns* in this Kingdom, and many are exercised in that Trade, that do not apprehend the Reason why the Malting

Malting of Corn should make it yield a Better and more acceptable Drink than the same Corn would have done before it had been malted. It will not therefore be amiss in this place a little to Philosophize on that Subject ; For it is most evident, that the Meal or Flower of any Corn or Grain unfermented, being concocted in a proportionable quantity of Water, will make a glutinous or mucilaginous matter. As *Laundresses* usually make their stiffening Liquors for their Linnen, of Starch, which is only the Flower of Wheat reduced into that form ; and in case there be no more Water added than will make it up into the form of Bread, and such a mass be baked without fermentation, it cometh forth like a lump of Clay, ungrateful to the Pallat, hard of digestion and unwholsome ; so that neither Bread nor Drink made of Corn, without Fermentation, could satisfy our Ancestors, which excited them to the discovery and use of Fermenting of their Bread-Corn by Leaven, and since that by Yest, which is no other than the scum of Ale or Beer made of malted Corn. Malting being no other than a fermentation of Corn, making it yield

to

to the Brewer its Spirit and Tincture, pleasant to the Palate and wholesome to Humane Bodies; extractions or decoctions of unfermented Grains being pale and not tinged or coloured, as are those of malted or fermented.

The imbibition or steeping of Barley in Water for 2 or 3 days or more, as the Season requires, hath this operation that it relaxeth the viscous matter of the Grain that defendeth and preserveth the life that is in it, from Heat and Cold; for as long as its Viscosity remains, the Grain or Seed is capable of Vegetation; but when by age or other accidents that is decayed, it becomes a dead Body; For such relaxation must be made in all Seeds sown in the ground, by the moisture they find there, before they can vegetate or encrease.

Now after the Malster hath steeped his Barley its due time in the Cistern, (for it must not lie there too long, lest it lose its vegetating Vertue too much by dissolving its whole body into a soft substance,) Then he layeth it on a heap, where it acquireth some warmth (as all moist Vegetables will do, when lying close together,

When the Barley is in the cistern if it be stirred well, and the light Grains that float be scum'd off, the Malt will be the better.

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which causeth the Barley to emit its Root which they call *Chitting*, which the Malster suffereth to grow to a certain degree of length; then spreadeth it abroad, and by his careful turning, stirring and gradual drying his *now-making-Malt*, he prevents the overmuch growth of the Roots which now are called the *Come*, from their hair-like form; for till the *Come* is out long enough, and the Corn begin to spring, the viscous matter of it is not enough putrified, dissolved, or rather changed; and if they are suffered to grow too much, the Stalk of the Corn will shoot and extract too much of the Vertue of the Grain, leaving nothing but an empty Husk behind it,

As the overmuch *comeing* and springing of the Stalk of the Malt empoverisheth it; So its not *coming* or springing enough, leaveth it but in part malted or fermented; and so doth the unequal *coming* or *springing* of it, that is, some of the whole Grains thoroughly malted, and some of them not, which is occasioned sometimes by the unskilfulness or negligence of the Malster by not duly ordering his Heaps, or turning the same, whereby the Corn on the outside of the Heap through drought,

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drought, comes or springs not enough; and that on the inside through warmth comes and springs too much, and so becomes *Acrospired* or *Akerspired*, by reason that the Stalk (here resembling the Germinating of a growing *Acorn*, and which the Learned Dr. Grew calls the *Plume*) extracteth the vertue of the Grain; or else from the uneven growth of the *Barley*, which in some years from the unseasonableness of the seed-time becomes *Ridge-grown*, that is, some part thereof being grown green above the ground before the other part through drought be come up, yet by reason of some Summer Showers all growes to the Harvest, where one part is ripe before the other, from the one of which Causes there is much *Malt* that is not good.

After the Malster hath thus by his skill and industry, so made this Grain to ferment, that by a certain degree of putrefaction the viscous or tenacious matter of it be relaxed; and by his nimble hand hath prevented the expence of its Noble Spirit; He then makes use of the third part of his skill, The calcining or drying of his Malt, which puts a stop to all further Germination, and makes it capable of

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being

being preserv'd for use : But the principal end of it is to make it yield its *Spirit* and *Tincture*. This calcination or drying must be gradual, and not hasty ; for the longer *Malt* is drying on the Floor before it be laid on the Kiln, the better will it be ; for all hasty Calcinations wast the *Spirits* more than flow.

It is most certain that every Seed contains a great Spirit in it, some more and some less ; For it is the Spirit in it that preserveth it, whereby it endure so much Cold, Heat, &c. as most sorts of Seeds usually do : And in this Spirit in the Seed is concentrated, the vertue, form, power and whole *Idea* of the Plant that produced it ; else could it not by being sown in the Earth, present unto you again, another Plant in every particular like to that from whence it came. And this Spirit in *Barley* is very great, as may appear by its product ; for one *Barley* Corn sown in the Earth, hath sometime produced 30 or 40 Stalks, and on them 5 or 600 increase of Seed ; and by some additional improvement, a far greater ; when the Seed of many other Plants produce but one Stalk to each Seed : Therefore the fermentation of this Grain by Malting is not

not an exaltation of its active Principles; as some would have it, but a dissolution or relaxation of that viscous matter that detains them, and puts a cheque or stop to its Vegetation, which would otherwise according to the Laws of Nature necessarily follow and exhaust its *Spirits*; For common Water cannot be supposed to add much to the exaltation of the Spirit, or active Principles of Corn: Nor indeed can any thing add to the improvement of the high vertue that is in Seeds, but what containeth in it much of the *Spiritus Mundi*, or Universal Agent, As *Nitrous Waters*, *Salts*, *Dungs*, &c. or their being sown in fresh Land that is enriched with it; For Water is but a vehicle to convey such Principles: Water and the Principles being not the same thing.

After the *Barley* is opened and its vegetating property prevented by drying it; it is now thereby made capable of yielding its *Tincture* or *Vertue*; For the Aquosity or Phlegme of any thing, especially of a Vegetable, preventeth the extraction of its *Tincture* or *Vertue*: Therefore the drying of *Hops*, *Wormwood*, *Broom*, &c. is not only done for the preserving them,

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but for that the Liquors wherein they are infused, do the better extract their Vertue; As those that have infused the same in their *Beer* can witness. So Malt, whilst it is green, will not make Ale or Beer of that strength, as it will do when dried; And if it be but easily dried, the Ale will be paler than if it be thoroughly dried; and in case it be hard dried, or over dried, the deeper will the Tincture of the Ale be. But such over drying usually waists the Spirits of the Malt, which are now loose, and by this Art made Volatile.

Fermentation of Ale.

The Fermentation of the Meal of any Corn for Bread by Yest, Leaven or the like addition, openeth its Body and relaxeth the Viscosity that detaineth its Spirit, which is the cause that the Bread of such a fermented Malt is light, grateful to the Palate, easie of digestion, and wholesome; and if not so fermented, it becomes in every point the contrary.

The cause of roapy and windy Drink.

Hence it is that Ale or Beer made of Malt not thoroughly malted, or of such, that part thereof is well malted, and part not, becomes *Roapy*, by having not its

its Viscosity wholly taken away in the first operation, or made by adding Oaten Malt, or Oates mixed with other Malt, whereof is that Drink made which they call *Oat-Ale*; All which is unwholesome, causing Obstructions and great Windiness in the narrow passages of the Blood in Humane Bodies.

The like doth Bread or any other matter made of Wheat unfermented, or that hath undergone some degree of Germination before it hath been at the Mill, whereby a due fermentation is impeded. The reason of this my present discourse on Malt, or fermentation of Corn or Grain, is not only to forewarn all good Husbandmen that they be cautious in eating or drinking any thing made of unfermented Corn or Grain, unless it be otherwise prepared, by due coction, or good additions, according to the Culinary Art. But also to excite such that have *Art, Skill* and *opportunity* to make use of this Art of fermentation on several other *Grains, Seeds, &c.* for the extracting their spirits or better parts; ever varying the method of fermentation according to the nature of the Grain or Seed to be fermented; for some Seeds

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require

require much longer time to be imbibed, than doth *Barley*, ere their Viscous matter be relaxed, and so nevertheless retain their Spirits even to Vegetation; as the Seeds of several Vegetables that have undergone all the operations that *Barley* hath done in Malting, yet will germinate and encrease when sown, as if they had never been so ordered; the like will some Grains of *Barley* that have not been fully ripened; and all *Barley* doth require more or less time and skill to malt, it according to the different Seasons: All which deserve the enquiries into, and considerations of the Ingenious.

Note that the viscous matter that preserves the Vegetable Spirit in all Seeds, being relaxed by Fermentation, such Seeds tumefy, and are thereby made more easie in parting with their Spirits. For *Barley* when it is malted, occupieth more room than it did before, although it be diminished in its weight by the loss of its dust, (the *Come* :) And Meal when it is fermented for Bread, encreaseth in Bulk; but without addition or diminution of its weight: So that fermentation is no other than a relaxation of those Bonds that

that preserve the vegetating Seed for production, and that prohibit the expence or wast of its Spirits till those Bonds are relaxed or broken.

I have this to add to what hath been already treated on concerning these subjects. To wit, That the Seeds of *Hemp* being so desirable by Birds, and seeing that Pigeons in the Hemp-Countries about *Lincolnshire*, &c. are so large and fat. It may probably be a considerable addition to the Improvement of Lands by sowing of Hemp, to convert the use of its Seed to the feeding of Poultry, and other Fowl; for it is a great Crop of Seed that an Acre of Hemp will yield, besides the benefit of the Stalks.

*Of Hemp
and Flax.*

*Benefit of
Hemp-seed.*

And in case such Seeds should give the Flesh of Fowl fatted therewith, some ill Taste, as hath been reported, yet that would be soon altered by feeding the Fowl 2 or 3 days before they are killed with other Grain; for such a Taste or savour contracted by the Food, is soon altered and made connatural by the heat of such quick digesters.

But the great Improvements that are to be made of Hemp and Flax, are by converting

converting the same into *Linnen*, *Paper*,
or *Cordage*.

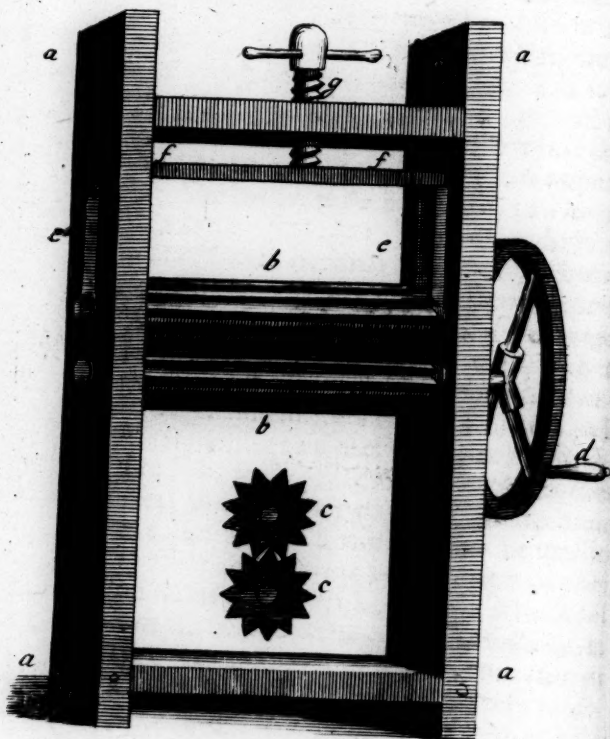
*Of the ma-
king of
Linnen.*

The making of *Linnen* in this King-
dom would much encourage the sowing
of *Hemp* and *Flax*, but there are several
Objections raised against it. The one
is, That our *Hemp* and *Flax* are more
hard and stubborn than foreign. To
which I answer that, it doth not appear
to be so in many places; for in *Derby-
shire*, where much is used and made into
Cloath, it is much more soft and easie,
than some sorts of foreign Cloath. And
if it were so that *Hemp* and *Flax* were
hard, yet it is easily made soft, either
by watering; for the long and often wa-
tering of it wasteth that gummy and
glutinous matter that occasions the stiff-
ness that is in it, aswel as it makes the
the stalks or spills within it brittle and
more easily broken; Or, it may be made
soft by beating: But that being a work
requiring great Labour, That it is be-
come a punishment inflicted on some sort
of Malefactors, and by consequence many
hands and great charge are required.
I shall here propose a way, that in all
probability may accelerate this Work,
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A Description of y^e Engine for dressing Hemp & Flax.



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and very much contract the labour and pains about it ; which is thus,

Let there be two upright Posts fixed as *a a a a*. at a convenient height and thickness, and about 3 foot apart, more or less as you please ; let there be 2 solid Rolls of Beech, Elme, or rather some harder Wood, of about 5 6 or 7 inches diameter, and as long as is the distance between the 2 Posts, as at *b b*. let these Rolls be toothed with 8, 10 or 12 Teeth, as you please, equidistant, that they may exactly shut the one in the other ; as by the Ichnographic description of the ends of them appears at *c c*. The lower Roll must run in fixed Sockets with a handle at one end thereof to turn the same as at *d*. but the upper Roll must run in 2 moveable Sockets made in 2 pieces of Wood that may slide up and down, as at *e e*. within the 2 upright Posts: Then let a Spring be made of *Bugh*, *Ash*, or other springing Wood, or of *Steel* or *Iron* well tempered, each end to rest on the sliding pieces, as at *f f*. which Spring may receive its pressure from a Skrew at *g*. By the force of which Spring the upper Roll may be depressed

The description of the Engine for dressing of Hemp and Flax.

pressed on the lower so strongly, that Hemp or Flax may (by being drawn through between them) be far better and easier broken or mollified than by the ordinary Heckling. This *Engine* may be made with Handles at each end for 2 to turn; and then 4, 5 or 6 may feed it, and take it away on the other side to dispose of it in order: And the work may be often repeated as there is cause. And the Spring every time harder depress'd by the Screw; that as in the common way the Flax is heckled three times, and every time in a finer Heckle, so here it may be every time harder wrought through the tooth'd Rolls, and often working it through the Rolls, will make it exceeding fine. An Ingenious Workman will soon make this an useful and profitable *Machine*, although at first it may not seem to be so; for any thing that is new requires patience with some damage to make it perfect; as every Mechanic that undertakes a new piece of Work can tell: Therefore this requires a willing, as well as an Ingenious Workman to make it compleat.

Another Objection is, that our Linen is not so white as foreign: Which is answered

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answered as the former ; That often watering of it will make it whiter, as every Whitster can tell : So that if Hemp or Flax be watered and beaten, it will become the more subtile and white. It is observed that in the making of the finest Linnen beyond the Seas, several years are required for the preparing or reducing the Flax to such a fineness and whiteness ; which here we despair of performing, unless we can accelerate the same by the said Engine ; For if often washing of Linnen will make it white, and much beating and heckling it make it soft or subtile ; Its very probable, that by watering or washing, and often working it in this *Engine*, it may be made soft, fine and white.

For the difference between coarse Linnen and fine, seems to be in the softness and fineness of the Hemp or Flax, (which is more easily spun into a small Thread) and the whiteness of it, to which whiteness it ought to be reduced before it be Spun or Woven, else it will be very difficultly whitened after, without prejudice to the Cloath if very fine : For we may observe that ordinary Linnen by often wearing, washing and hanging abroad in the

the Air, becomes soft and white, but with prejudice to the Cloath, because it cannot undergo those several hardships without a sensible loss or decay.

It is observed that frequent washing and wearing of Linnen makes it the whiter and finer, and that in the washing, Ashes of Wood, or other Vegetables are used, either in the Soap, or the Lixivum or Lye, wherein such Linnen is washed, which very much conduces to its softning and whitening, which is the true meaning of what *Paracelsus* affirms in the 7th Book of the *Nature of things*. *That of Flax boiled in sharp Lye, made of the Ashes of Wood, is Silk made*; That is to say, It is reduced to the fineness of Silk, and equal to it in price; for there is fine Linnen equal in value, weight for weight to Silk. It is the *Alkali* of Vegetables, or the Salts of their Ashes that are of such efficacy in this Work, for the Waters which the Whitsters use, are impregnated with the like matter, but in so small a measure, that they operate but slowly: But in the elevation of Ashes, those of the *Ash*, *Beech*, or other white Woods are to be preferr'd, because some may probably cast a yellowish colour, disadvantageous to Linnen. The

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The principal advantage to the Kingdom that the making of Linnen here would be, is the prevention of the importing of foreign Linnen, some part whereof is already accomplished by our using so little in the burying of our dead; and in the more general wearing of *Flannel Shirts*, &c. in stead of Linnen, being (by far) more pleasant, healthy and cheap, as many of our Nobility, Gentry and Commons, can by many years experience testifie. It is also another great advantage that would redound to the Husbandman in the improvement of his Lands, by sowing Hemp and Flax, and very necessary in the employment of many People, in case there be any place where employment is wanting.

The want of People, I know, is the main impediment to this great design of making our own Linnen; for in *Derbyshire* the common People are employed in the Summer-time in washing Lead-*oar*, and in the Winter, when the other Employment fails, they fall to Spinning, Weaving, &c. which makes our home-made Linnen so plentiful in those parts: Therefore all ways should be promoted that shorten the work, and lessen the pains

pains in dressing and fitting the Hemp and Flax fit for the *Spinner*; And if any way there be more nimbly to spin the Thread, and then to weave it with more expedition, the same should be discovered and encouraged. There have been Looms or Engines made to weave several Ribbons at once, that is, by the same labour, and in the same time as they usually weave one; and such Engines have been broken by such that had no farther prospect than private interest, which makes the Relation of the *Dantzick Invention* more credible; It was, as is said, a rare Invention for Weaving of 4 or 5 Webs at a time, without any humane help: It was an *Automaton* or Engine that moved of it self, and would work night and day; (being as is to be supposed, kept in motion by Weights or Water.) It was suprest, because it would prejudice the poor People of the Town: And the Artificer made away secretly (as was conceived) as *Lancellotti* the *Italian* Abbat relates out of the mouth of Mr. *Muller* a *Polonian*, that he had seen the device.

Another

Another use of Hemp and Flax, is for the making of Paper. The first Material that was used to write on, as we read of, was Stone, on which the Law was written. The *Sybil's* Books were said to be written on Leaves of Trees; sometimes the Rinds of Trees served for that use: And for many Ages was no other Paper used, than what was made of Reeds, which grew on the Banks of several Rivers, and plentifully on the Banks of the *Nile*.

Of the making of Paper.

But the modern Invention of Paper made of Linnen, surpasseth all in this kind, being so close compacted, so white and durable, that it may be reckoned among the singularities of Art; And it is a vast quantity thereof that is daily used in this Kingdom, in Printing, Writing, &c. That could it be made here, it would be of great advantage to the Nation, and in particular to the Husbandman. There are two objections or difficulties that lie in the way; The one is, That there is not old Linnen enough in *England* to be easily had for that purpose; for Paper hath hitherto derived its pedigree from the *Dunghil*; and old Lin-

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nen must come cheap to the Paper-mill, and Linnen being in *England* a dearer Commodity than Woollen, and the Country colder, Linnen is not so much worn, as in warmer places; and so not so many Rags or refuse Linnen to be gathered for the Paper-mills: To remove which there should be encouragement given to some small Agents in Towns, to gather up and buy all refuse fine Linnen that can be had; As now in many places there is for coarse Linnen, and ends of Ropes, &c. for the making of Brown-paper.

And in case that design take of reducing *Flax* to a certain degree of Whiteness and fineness, by the before mentioned *Machine*; there will be much Tow or refuse Flax, that may by the Paper-mill Hammers be reduced to the same consistence, as hard seamy Rags of Linnen-Cloath usually are.

The second Objection is, That our Waters in *England* make not so white Paper as some foreign Waters do. For it is observ'd, that in *France* the whitest Paper is made but at some certain place, where the Water is more fit for it than elsewhere. In answer to which, There

are

are several Springs and Streams in this Kingdom that proceed from Chalk or rocky Mountains, that in the distilling leave a fine white residue in the bottom, that may be as fit for this purpose as any foreign Water whatsoever. Therefore Waters may be tried in several places before the main work is begun. But this old Objection of want of good Water, is now become invalid: For since the French Mechanics have come over into *England*, they have proved the Water here to be equally as good as in *France*.

If Lands may be rented, and provisions for the Workmen may be had cheaper here than in other Countries; Then surely may *Hemp* be propagated, and Cordage made at easier rates, here than abroad; which being done, more might be exported, and less imported, to the great encouragement of *Agriculture* and *Mechanic Arts*. But an Objection here is also raised by the *Ropers*, viz. That our *Hemp* is harder than foreign, and doth not work so fine, nor take Pitch so well, *Quere*, whether much watering

Of the making of Cordage

tering may not abate its Viscosity, and make it more pliable.

CH A P. V.

Of the Manuring, Dunging and Soiling of Lands.

*Denshiring
of Land.*

IT is now become a general Improvement of Champion or Green-sward Land, to Denshire or Burn-beat it ; By which means very plentiful Crops of Corn are raised on poor and barren Lands. But the method now used by cutting or paring off the Turf with a Breast-Plow, is very laborious, tedious and costly, and sometimes very hazardous ; By reason that in a dripping Summer, this Work is much impeded, the Owner frustrated of his expectation of a great improvement ; for that a great part of the Turf is not thoroughly burnt, and so becomes useless, and the Workman much damnified, being at a great trouble in often turning his Turfs before

he

he can apply his Fire; and then at the charge of Furze, or the like Ollet, to burn the Turf withal; And the usual expence in *Denshiring* an Acre in a dry Summer, when at best, is twenty Shillings, or more; which in a bad year the advantage made by this Husbandry will not repay, although in a good year it will double it.

To make *Denshiring* therefore more easie and cheap: It is not difficult to make an Instrument to pare off the Turf as thin or thick as you please; That instead of being forced forwards by more than ordinary humane strength, it may be drawn by one or more Horses, but not without the skil or labour of a good Workman to guide it: It must have two Wheels or Trundles; If they are low, then may your paring Plough rest on the Axis; but if larger Wheels be found to be most proper, then may the paring Plough be fixed at some distance under the Axis; and either way it must have a long Stail or Handle, by which the Workman by elevating or depressing thereof, may cause the Turves to be pared thinner or thicker as he pleases, and as the

*A Denshir-
ing Plough*

unevenness of the ground requires, so may he thereby regulate the Work. And thus with one Horse and two Men, may two Acres at least be pared in a day, in case the ground be even or smooth; but if uneven, or full of Stumps or Hills, then it requires reiterated operations; yet may two such Men and one Horse, pare an Acre in a day; and the Work every whit as well done, as by the tedious Breast-Plough.

Thus may an Acre be densed for a fourth part of the expence, and in less than a fourth part of the time, than by the other way. And although there may be but little dry Weather together, yet may you do a great deal whilst it lasts.

There can be no exception made against such an Instrument, nor difficulty arise in the use of it: But an ingenious and willing Artist, may by altering and amending it, as he finds the Error, answer it, and make it practicable: For there is nothing that is newly invented, but may and usually doth meet with rubs, and sometimes not a few in the way, before the Artist brings it to perfection; But this is an Instrument so feasible and
benefit

beneficial, that I cannot but encourage such that have Lands capable of this way of Improvement, to spend some time and skill in perfecting it: The want of such Lands of my own, preventing me from doing it.

You may also apply to this use, the new Plough hereafter described in the eleventh Chapter.

CHAP. VI.

Of the Benefit of Raising, Planting and Propagating of Woods.

*Preserving
of Woods,
good Hus-
bandry.*

Much hath been written by diverse able Pens, in Commendation of Woods, as one of the principal general Improvements that can be made; Yet have some pretended that destruction of Woods in any place, would very much advantage the Trade of such places; by reason that the want of Timber, Wood, &c. for Mechanic Uses, and for Fuel, would necessarily introduce Employment for many, in bringing all such materials, as must supply these defects that are occasioned by the destruction of Woods, which may be true; as well as, that the Burning of any *City, Town or House*, begetteth employment for several Mechanics. But what is this to the benefit or advantage of the whole, which is ever to be weighed and considered of, in the promoting of any Improvement, Trade or Im-

Employment? For in case the Timber and Wood, that now serveth any City or Town, with Materials for Building; and for all sorts of Mechanics that *Work* in Wood; as Joiners, Turners, Wheelwrights, &c. and all poor and rich for Fewel, should be so devastated, that the Inhabitants of such places, should be constrained at an extraordinary expence to furnish themselves from abroad, with the like necessities; although the Carriers of such may in all probability gain very much thereby; yet every Tradesman must pay the more for what he hath occasion for; And by the same Rule must raise the prices of his Commodity, that is made of it; and in time must remove himself to such places where he may exercise his Trade at a cheaper rate.

To descend to particular Examples of places: The Greatness of the Famous City of *London*, may partly be imputed to the plenty and cheapness of Timber and Fewel; without which in all probability it could never have increased to that Magnitude. Nor had the Cities of *York*, *Bristol*, and many others grown so great, but from the same cause. And
many

many Towns standing in the more Champion parts of the Kingdom, shew to every Traveller, that they are miserable in respect of their Buildings, Trades, and Fewel. All which is sum'd up in a few words, by the Pen of the most accomplish'd Writer on this Subject, in his discourse of Forest Trees: *Since it is certain and demonstrable, (saith he,) That all Arts and Artisans whatsoever, must fail and cease, if there were no Timber and Wood in a Nation; (for he that shall take his Pen, and begin to set down what Art, Mystery, or Trade, belonging any way to humane Life, could be maintain'd and exercis'd without Wood, will quickly find that I speak no Paradox,) I say, when this shall be well considered, it will appear, that we had better be without Gold, than without Timber,* Chap. 31.

It is not the defect of any Commodity that makes a Trade, nor the dearth of Provision; but the natural situation of the Place, the industry of the Inhabitants, and the plenty of Materials and Provisions: For it is the plenty of Provisions, and other Materials, with the industry of the Inhabitants, and situation of the places, that contracted so
great

great a Trade to *Barbadoes, Jamaica,* &c. and with that, great plenty of Mony ; So that to say, *Its better to live where your Dinner must cost a Dollar ; than where you may Dine for a Groat ;* is no argument that Provisions are more scarce and dear, where your Dinner must cost a *Dollar*, than where it may cost but a *Groat* ; but that there is more plenty of Mony : For in the most fertile Provinces or Places of *Europe*, is the greatest plenty of Gold and Silver, which have been extracted out of the most sterile Regions of the Earth. And by that plenty, are the rates and prizes of Commodities and Provisions esteem'd : As the rates and prizes in like manner have been in different Ages in this very Kingdom. For saith *Stow*, *Anno 1288*. A Quarter of Wheat was sold in *London*, where it was dearest, for 3 s. 4 d. in other places at 20 d. 16 d. 12 d. and in the West and North at 8 d. the Quarter ; when in our Age, ten times that price, is too cheap to maintain the Husbandman. The rates of Lands, prizes of Cattel, &c. were much after the same rate and proportion : Not that there is now a greater scarcity of every thing, or a greater number

ber of People. But the Subterranean Stores, have by the indefatigable Industry of Man been opened, and their Treasures dissipated. And such places that have been most fertile, and abounding with Woods, and other necessities for Trade; well situated, and industriously cultivated, have by the interchanging of their Commodities, Provisions, and Manufactures, drawn to them the Wealth of the Indies, and other foreign Nations: And by their encreasing, and maintaining their Plantations of Timber, Woods, Corn, Fruits, and all other Tillage; and encreasing their Fleece-bearing Flocks, and other Cattel; do uphold and encourage the same Trade. But should they either neglect such political and excellent Husbandry; or instead thereof, destroy what Nature spontaneously produceth; instead of contracting Wealth from abroad, they may waste their Treasures in buying one of another, till they have nothing left to buy nor sell. Like unto the Ten Alehouse-keepers, (that when their Trade was low) agreed to meet at one of their Houses one day, and at another of their Houses the next; and so round to maintain

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tain a Trade amongst themselves, which they did till they found their Drink all drank out, and neither of them a peny the richer.

On the contrary; There are many Persons in this Kingdom, that suffer their Woods to grow too long, which is neither profitable to themselves, nor for the publick good. For when Timber or other Wood is at its full growth; it either stands at a stay, or sensibly decays, and some years before it hath done growing, it improves scarce one *per Cent*. Such Persons being possessed of an opinion, that it is ill Husbandry to cut down their Woods, (as too many have done) and considered not, that the Monies raised by such Wood-falls would bring in a greater advantage to them, than the slow growth of ancient Woods can be expected to do, in case they are not yet at their full growth; and if they are, then they evidently lose by their standing. And the felling of such well grown Woods, is also very advantagious to the publick: For it furnisheth the Markets with necessaries, which otherwise must be supplied from
foreign

*Cutting of
Woods at a
due Season
good Hus-
bandry.*

foreign Parts; for the less of the growths of foreign Countries we import, for our exported Goods or Monies, the more of our Monies we save, or else have the more of their Coin or Bullion. The due felling of Woods doth likewise produce an encrease of the same Species; witness the constant felling of Woods in *Berk-shire*, for the supply of many Mechanic Tradesmen in *London*, with matter to work on; and a great part of the City with Fewel: And the like in *Sussex*, for the supply of the Iron-works there. The gain arising from thence, encourageth the Owners of those Woods to propagate and preserve them; For in case any person hath (as I know some that have) an hundred Acres of Wood well grown, and shall every year fell five Acres of that Wood, until the whole be felled; always preserving the same after felling; by that time the whole is felled, the first five Acres will be very well grown again; and the Owner in the mean time hath a constant Revenue out of such Woods, and the Markets the better furnished. A notable Example of this Husbandry, hath the *most Worthy Mr. Evelyn* in his

Discourse

Discourse of Forest Trees, given of the Lord Scudamore, his having in less than thirty years after the felling of a decayed Wood, neer a 1000 l. worth of Wood grown on the same Land, not of above the value of 8 l. 10 s. per Annum. Chap. 34. So that the ill Husbandry is not in felling of Woods well grown, but in the not nourishing the growing Woods in the room of them. The same may be said in felling of single Trees in Hedgerowes. If such Feller did but propagate three for every one he fells, as in *Biscay* by the Law they are obliged to do. None need condemn such for ill Husbards, nor ever dread a scarcity of this Material.

In many parts of the World, the Woods are a great incumbrance, and hinder the tilling or improving their Lands. And in our foreign Plantations on the Western Continent, one of the greatest Expences they are at, is the cleansing their Lands from those cumbersome Woods that annoy them there; because they have but few Hands, and the Labour is great to extirpate them. And as I am informed, there is a Person that hath discovered a more easie way, than hath

*An easie
way to e-
radicate
great Trees.*

hath been formerly made use of, for the eradication of great Trees; And hath obtain'd his Majesties Letters, Patent, for the sole use of the said newly discovered Art, in some foreign Plantation. And will (as is said) undertake to cleanse those woody Grounds, at the rate of 6 *d.* *per* Tree, which is very reasonable in those Countries. The manner of that operation I cannot learn: But this I offer as a very feasible way to do the same thing; although perhaps it be not after the same method, which is only thus: Prepare two large Iron Hooks, with Loops to them; To each of these Hooks, fasten at the Loop a strong, double or treble Block for a Pulley; affix one of these Hooks to the Tree you intend to eradicate: Then go to the next, or some other Tree at a convenient distance, and affix the other Hook therto; and with a Cord duly applyed to these Pullies, may one, two or three Persons (as strength is required) so forcibly draw these two Trees together, that a small help at the Root of the Tree design'd for a fall, will soon extirpate it. The higher the Hooks are fastened to the Trees, the easier will those
Trees

Trees bend to each other: If the Tree to be eradicated, be larger than that you make use of to assist the work; then place the Hook higher on that Tree, and the lower on the other. If the Trees be large you intend to fell, then let your Pullies be with three, four or more Rundles, and you need not question but to master the greatest Trees in the Woods, without any hard labour, or long time spent in doing it: And when they are down in such places where their Wood is not valuable, their Ashes may, for a good Fire, will soon rid them out of the way.

C H A P. VII & VIII.

Of Fruit Trees, and Garden
Tillage.

HAVING wrote a particular Treatise of each of these Subjects, viz. *Vinetum Britannicum*, and *Systema Horticulturae*, since the publication of the first Part of this Work; what novel Experiments or Observations might be added to these two Chapters, shall be taken notice of in my second Part of these two Treatises, that entituled *Vinetum Britannicum* being hereunto subjoyn'd, to which you are referred.

CHAP. IX.

*Of several sorts of Beasts, Fowls
and Insects, kept for the advan-
tage and use of the Husband-
man.*

Without Horses, the Husbandry of England would be of little Worth; the most laborious parts thereof, being by them perform'd; No other Beast being so fit as these for the Plough, Cart, Travender-Waggon, Packsaddle, or grinding in the Mill: Therefore every good Husband ought to be very careful of his Horses, to keep them sound, and in good Heart; for on them depends much of his Prosperity.

And the great use that hath been made of the more generous and luxuriant of these Beasts, for the Saddle, Coach, Chariot, Racing, and especially for War (for all which Uses no other Beast is comparable to the Horse) hath

Of Horses.

been very advantagious to the Husbandman, especially to such that have Lands proper, and take delight in propagating the best kinds; There being no greater profit to be made of pasturing Lands, than by breeding of good Horses.

of cows.

As to the uses of *Milk*, *Butter* and *Cheese*, they are such, and so well known, that nothing can be more. I have only this to add, That as the various Soils, and the Herbage growing thereon, produce great variety of *Butter* and *Cheese*; although the Cows and the Housewifery too be the same: Yet it is most evident, that tradition and opinion have so far swayed with most Country-People, that here is the best *Butter*, and worst *Cheese*; and there the best *Cheese*, and worst *Butter* to be made; that therefore they will not be perswaded in the least, to alter their vulgar Method of making the one or the other; although of late years, some ingenious Huswives have inverted that Course, and made as good *Cheese* (where formerly the worst only was made,) as hath been usually made in such places, that have been celebrated for good *Cheese*. The like hath been observ'd in making *Butter*: For

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of the same Milk produced in any one sort of Lands, are different sorts of *Butter* or *Cheese* usually made, meerly by the different method of the Housewifry; as every one may observe, if they please. And although I pretend not to trouble the Reader, with the Art of making *Butter* and *Cheese*; nor to have any other insight therein, than bare speculation and hearsay; Yet I may from hence averre, that the Covetousness in some, and Ignorance in others, is a great occasion that bad *Butter* and *Cheese* are made of the same Milk; of which by good handling, very good may be had; for there is the same Philosophy in these transmutations, as is in the fermentations of Beer and Bread: And all Men are sensible of the differences of the strengths and tastes of those things, meerly from the Mechanic operations.

For as I have heard, some out of a greediness to have a great quantity of *Butter*, take off too much Milk with their *Cream*, which makes a poor hungry *Butter*, and a barren *Cheese* of the remainder; others of a better reputation take only the top *Cream*, with which

To make
the best
Butter and
Cheese.

they make their best Butter; and with the remaining Milk they make the better Cheese. All that is to be wish'd, is that the good Housewives understood more of this sort of Philosophy, and less wedded to Tradition and Humour; Then I am confident these Commodities would be very much improved. I will only here add a Receipt which I found in the *Annotations* on Mr. *Samuel Hartlib's* *Legacy of Husbandry*, how to make better Butter than ordinary, without setting the Milk for Cream, viz. *The Milk so soon as it is come from the Cow, must be strained, then Churn'd, as usually Cream is done. Also the Cheese made of the Butter-Milk, will be better than the best two-meal Cheeses that ever you did eat; And one pound of this Butter, shall be worth a pound and a half of your best Butter, which is made of Cream; probatum by a Gentlewoman, a great Housewife dwelling in the Isle of Ely; which if it prove on trial what it promises, may be of great advantage. Its probable the great labour which will be required in so great an Agitation, hath deterr'd the always buisie Housewife from prosecuting the Experiment; but the rolling or tumbling Churn,*

Churn, I suppose may effect it with much less labour than the upright.

It is usual for Housewives to set their Milk to cream in broad earthen Pans, or wooden Treys, which take up much room, and are troublesome in many respects; the design being to set their Milk as shallow as they can; it yielding the more Cream, or the sooner, which is better. Therefore since the Art of making Lead into thin Lamins, Plates or Sheets, hath been discovered; I have seen broad and shallow Cases of Board, made and lined in the inside with this Lead, with a Tap-hole at the one Corner of each, and a Plug of Wood fitted to it. These Cases were about two Foot in breadth and length, and were placed the one by the other on a Bench; the Tap-hole hanging over, that the Milk after the Cream be scum'd off, may be let out thereat into a Pail, or else the Milk may be thereby drain'd greatly from the Cream; and then the Cream received by it self, as the Housewife pleases. These Pans may be made greater or lesser as the Dairy requires, and may be scalded as they stand with-

*A new sort
of Milk
Pans.*

out removing them; the Hole a little declining to the Tap-hole. These Pans very much resemble the Brewers Coolers, wherein they cool their Worts: Thus may improvements be made even in the ordinary Arts of Housewifry, Cookery, &c.

*Of fatning
of Cattel.*

It hath been found by long experience, that the sweetest Food, fatneth Cattel soonest. Therefore the Pastures that lie most open to the Sun, are more desirable by all sorts of Cattel, than the shady, the one being sweet, and the other sower. And *Clover, Trefoil, &c.* more than common Grass, from the same cause. And all sorts of Cattel become Fat sooner on these sweeter Pastures, than on the more sower. Oates, the sweetest of all Grain, are more desirable by the Horse, than any other, and fatneth him sooner. Barley made sweet by making, then ground and mixed with Milk, fatneth Fowl, especially Geese sooner than any unfermented Grain. Milk by reason of its innate sweetness, nourisheth and fatneth more than any simple thing whatsoever.

It

It is observable, that the less Milk any Beast gives, the sweeter it is: Therefore *Asses* Milk is preferable to *Cowes* Milk, and the Red *Cowes* Milk to the Black: *Mares*, *Ewes*, *Sowes*, &c. give less Milk than *Cowes*; yet their *Colts*, *Lambs*, *Pigs*, &c. grow faster or fatter in proportion than *Calves*, and none of them will thrive so well with *Cowes* Milk, as with their own, by reason that *Cowes* give so great a quantity, and their Food only Grass and Water; it cannot be supposed that their Milk should be so Rich, as the Milk of those that give less, or feed higher: Therefore some that have nursed up young *Pigs* with *Cowes* Milk, have added Sugar to it; by which means, such *Pigs* have grown much in a little time, and very Fat withal, very much to the advantage of their Feeders; and their Flesh hath been extraordinary white and delicate, much more than if they had fed on *Cowes* Milk alone; neither would they have thrived so well, in case they had suckt their own Dam: Seeing then, that the sweetest Foods conduce most to the nourishment and fatning of Cattel, especially *Swine*; in the fatning of which
is

is the greatest advantage to the Husbandman ; such Foods are to be provided at the easiest Rates : Amongst which, *Turnips* are the best, which as they come raw from the Ground, may not answer the design : But in case they are boiled, and afterwards pressed, they yield a sweet and pleasant Juice or Liquor : *Turnips* (its known) may be raised in great quantities, at very easie Rates ; and in a Furnace or large Kettle, many of them may be boiled together ; these may be ground in the *Roll-Cider-Mill*, described in my *Vinetum Britannicum*, and there pressed (as Apples usually are for making of *Cider* :) In this expressed Juice, may you add ground *Malt*, *Barley*, *Oates*, or the like ; the sweetness of this Liquor , with those nourishing Grains in it, may without doubt fatten any Cattel, especially Swine, sooner and cheaper than their feeding on hard Corn can do, especially in such Years that Grain proves dear. If you boil your Turnips often in the same Liquor, that Liquor also will become sweet.

For it is the liquid parts of any Roots that nourish ; the Mure or refuse when the Juice is pressed out, addeth little to the

the nourishment of any Creature. And this expressed Juice here becomes a Vehicle for the Meal that you mix with it, to digest and distribute it according to the Law of Nature.

It may be objected, that Fat so suddenly raised, is not so firm as that which is caused from the Cattel, their feeding on harder Meat, which may be true: Yet if I can by this means raise my Cattel or Swine to a good degree of Fatness. I can for some reasonable time after feed them with hard Meat, till their Fat is better digested, and made more

C Great Drought attended the Heat in the Spring, usually determines about the Summer Solstice, or soon after: For the advance of the Sun to the Tropic of Cancer, in a very hot Summer inclines the Air to Showers, something like the alteration of the ~~Season annually begotten by the season~~ of the Sun on the Northern Coast of Africa: where the Rain is followed by the very soon after it hath raised the most Northern Degree of the Equinoctial-line, the Egyptian Nile gives a Testimony of the same: So in

C H A P. X.

*Of common and known external
Injuries, Enemies and Diseases
incident to, and usually afflic-
ting the Husbandman; and their
Preventions and Remedies.*

GREAT Drought attended with Heat in the Spring, usually determines about the Summer Solstice, or soon after: For the advance of the Sun to the Tropic of Cancer, in a very hot Summer inclines the Air to Showers, something like the alteration of the Season, annually begotten by the access of the Sun on the Northern Coast of Africa; where the Rains so follow the Sun, that very soon after it hath passed the most Northern Degree of the Equinoctial-Line, the Egyptian Nilus gives a Testimony of the same: So in this our oblique part of the Sphere;

if the Spring be Hot and Dry, the Summer usually proves Wet, as it did in 1681. when we had the driest Spring that had happened within Memory; and soon after the *Suns* entrance into *Cancer*, great Rains followed.

In the like case, which sometimes doth happen, where the Husbandman foresees a defect of Pasture or Fodder for the succeeding Winter, by reason of the Heat and Drought of the Spring, or early part of Summer; He may sow a proportionable part of his Farm with Turnips, which may be sown in the greatest Drought, and in the next Rain they will grow; and a showry Autumn (of which he need not despair) will make his Turnips so flourish, that an Acre of them in the succeeding Winter, will stand him in more stead than several Acres of his Meadow Lands.

The Seeds of Turnips are very much desired by small Birds, which not only prey upon them when ripe on the Stalk, but when sown on the Ground, and especially when they first begin to aspire, they draw the swoln Seeds out of the

Prevention of scarcity of Fodder by Drought.

To prevent Turnip-seeds from being destroyed by Birds and other Vermin.

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Ground

Ground by the tender Shoots, and so destroy many, yet leave behind them enough to stock your Field. But that which proves the greatest destruction to your Turnip-feed, are the multitudes of Flies that usually at that Season of the Year by the Suns influence are generated among the Stubble, that remained in the Fields where you now sow your Seeds: For it is observ'd, that an easie ploughing and sudden sowing of these Seeds, makes them more apt to be thus destroyed, than a well dressing, and more leisurely sowing, for this deprives those Vermin of their shelter and sustenance, that they generally die before the Seeds are come up: However to prevent the worst, take Soot, especially out of Chimnies where Wood is burnt, and steep it in Water; and when the Water is well tinged with the Soot, thoroughly moisten your Seeds therewith; then spread them abroad on a Table or Floor, and when they are a little dry again, then sow them, and the bitterness they have attracted from the Soot, is said to be a security against Birds, Flies and Insects.

Choice

Choice Seed well limed and sown on good Land, that was not sown with the same Grain the precedent Year, rarely produces smutty Corn: For smut-tiness is a degeneration of the Wheat; caused either by sowing the same Land often with the same Species, or else with Seed that hath been taken from the adjacent Land, of the same nature with that on which it is sown; or else by sowing it on very poor Land, where the bulk of the Straw and Corn is raised, either by the force of Dung, or a drippy Summer, rather than from the natural strength of the Land. Therefore if your Land be fit for Wheat once in 2 or 3 years, buy your Seed from another Soil, and see that your change be proper, which the experience of your Neighbours can best inform you: For although you fetch it a great way, yet the large product will easily defray that expence: And let not your Land be sown often with the same Grain. Then before you lime your Wheat, put it into a large Vessel, fill it with Wheat about half full; then add so much Water as will quite

*To prevent
smut in
wheat.*

fill the Vessel ; then stir it well, and scum off all the light Corn , and so keep it stirring to the bottom of the Vessel, till no more of the Wheat will swim, and then lime it : Thus do to all your Wheat that you sow, and you will not have a smut-producing Seed left ; for the light imperfect Corn, it is that produces the smut.

*To mow
or reek
wheat to
prevent
Mice.*

Great care is used in many places to build *Reek-stavals*, on which they Reek their Wheat to prevent the Mice, which otherwise would devour it : By which Vermin, Mows of Wheat in Barns are very subject to be devour'd : Therefore to prevent Mice from feeding on Wheat-Mows in Barns, after you have lain your Course of Straw to bed the Flower withal, strew sand round on the edges of the Bedding ; then lay a Course of Sheaves, and on the ends of the Sheaves, at the outside of the Mow, strew more sand, and so on every Course of Sheaves round the Mow to the very upmost Course ; by which means it will be preserved from the Mice : For when they endeavour to make their way into the Mow, the sand (which will soon be

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very dry) will fall into their Ears, and so torment them, that they will never attempt to come there again: This hath been many years used by an able Husbandman, with the desired success, and without the least inconvenience or damage to his Wheat, for the sand will never mix with it.

Snakes, Adders, Blind-Worms, &c. To destroy
many times are hurtful to Men and *Snakes,*
Beasts: To destroy which in such places *Adders,*
where they usually haunt; lay a Bed *&c.*
of new *Horse-Dung* about *April* or *May*,
and in *July* and *August* following, cast
your Dung in a Morning to one side,
till it be all removed, and you will find
their Eggs, and it may be many of the
old ones which you may destroy; this
may be done twice or thrice in a Sum-
mer. Thus have I for several years,
destroy'd many in my small Vill; for
the warm Dung, attracts them from the
several parts of your Ground to lay their
Eggs therein, as stinking Flesh doth the
Fly, whereas in a Trap you may take
them; if your Ground be large, you
may place several of these Dung-heaps.

82 *Of Enemies and Diseases, &c.*

To prevent
and cure
the Rot in
Sheep.

Sheep being Beasts that delight in dry Meats, and thrive best on the dryest Lands, Mountains or Hills, and can live throughout the Year without Drink, (except in great Droughts) are subject to the Rot in very wet Years, or in moist Pastures: This Disease being caused by cold and moist Food, filling their Bodies with a superfluous moisture, and decaying their Livers, soon destroys them. The usual preventions therefore of this Disease, have been to feed them on the driest Lands, to keep them late in the Fold in the Forenoons; feed them with Hay, and mixing Salt with it, &c. But where these are not with conveniency to be made use of; it may be considered whether some sorts of Vegetables may not be propagated as proper Remedies, as well to cure, as prevent this Disease, as some have been to cause it. Amongst which preventing or curing Vegetables, none seems more efficacious than *Parsley*, a Plant easily propagated, and hath all the qualifications of such a Medicine or Remedy; Of its Propagation and Vir-

tue

ue, see more in the third Chap. of this second Part.

CHAP. XI.

Of Instruments, Tools and Engines, incident to this Profession of Agriculture.

THE most principal Instrument used in Husbandry is the *Plough*, and as it is, so have ingenious Men contrived so many ways to make them more useful, and less toilsome; that there is more variety of *Ploughs* in this Kingdom, than of any other *Machine* whatsoever. But that which I am now to add to my former Treatise of this subject, is, That there are divers new sorts of *Ploughs* invented, and endeavoured to be brought into use, since my publishing the former Tract: As the *Steel-Plough*, a Model whereof was (not long since) curiously made by one Mr. *Thomas Llewellyn*

*Of the
Steel-
Plough.*

Llewellyn, at the *George in Catteden-street* in *London*; wherewith he pretended, that with one Man and two Horses, or one Man and two Oxen only, might be plowed any sort of Land whatsoever, as would not be performed by the common Ploughs, with less than double the Men and Cattel, which he offered as an infallible and unmatchable improvement. I have seen the Model, and it was well made; and without question such a Plough will far exceed the usual Ploughs, by reason that a well made, true and clean Instrument of any kind or sort whatsoever, will perform its Work for which it is intended, better than an ill shapen, false and rough can do. A Coach, Charriot, or Waggon, made high and true, will be drawn much easier than one that's gross, and ill made. The Cutting parts of the Plough, also being made of well temper'd Steel, and keen, abate a great part of the strength required in the Draught, as a sharp Ax or Saw, will more easily break a Tree, than one that's dull. I know it will be objected that Steel is much dearer than Iron: To which I answer, That in case a Plough cost 20 or 40 *s.* extraordinary in the Steel

Steel and Workmanship, it will soon be repayed, if 1 or 2 *s. per diem* can be saved (as no doubt but it will) in the use of it; besides the advantage of time, which is of more worth at some seasons, than all the extraordinary expence amounts to. As for the other more principal advantages of this Plough, with the description of the Plough it self, I refer you to the Author Mr. *Llewellyn*.

There is another sort of Plough *Of the French Ploughs.* brought into use by some French Men, (as I take it) which is very much like the double Plough described by Mr. *Blith* in his 33th Chapter of his *Englands Improvement*, which will carry two Furrows at once: As for the description, use, and advantages of this double Plough, I refer you to the *Monthly Collections of Letters, of Husbandry and Trade*, Collected and Published by that publique, spirited and ingenious Mr. *John Haughton*, Fellow of the *Royal Society*, where it is at large described, with its uses and advantages.

In light Grounds it is usual for six or more labouring Men to follow the Plough *The description of a Trenching Plough.*

Plough at some distance ; each taking some proportion with their Spades to cast up the Earth from the bottom of the Furrow, on that which was turned over by the Plough ; so that an Acre of Ground may thus be Plough-trenched in a day, as well as if the same had had been wholly done by hand ; the Plough going before, and turning in the Sward or Turf ; and the Spades coming after and covering it with light Earth, makes it capable or fit for various sorts of Tillage to be planted in it : This way saves a great part of the charge of Trenching altogether by the Spade.

But an easier and cheaper way may yet be found to Plough-trench Land, without any help of the Spade ; which is by making a Plough that shall undercut the Earth, and cast it over, instead of the usual way of plowing: For in the usual way, the Plough is made pointing, and is forced under the Sward, and by the spreading of the Plough, and help of the turning Board, the Earth is forced fromwards, which requireth much greater strength, than if the Plough were made of a proportionable breadth from the the point of the Share, to its hinder part,

part, and the Earth or Sward carried from the bottom, and a turning Board cast fromward ; and then you may add either a second Coulter and Share, to succeed the former (fixt to the same Beam) about four or five Inches lower, which second Coulter and Share will cut and take up another course in the bottom of the Trench, and carry it higher, and then the turning Board will throw it on the first Plowing ; or else another Plough may be made to cast higher than the first to follow it : Each of these Ploughs may be drawn with half the strength of the common forcing Plough, because it cuts, raises, and casts over the Earth without any side-forcing.

This Plough may be made five, six or seven Inches broad or more, according to the nature of the ground, and strength you intend to use, whether one, two or three Horses to draw it ; and will not only serve to plough, and Plough-trench Land ; but also to pare off the Turf of ancient Pasture Land, in order to the burning of it ; for the Foot on which the fore-end of the Beam rests, may be made to stand higher or lower as you please ; that it may cut thinner
or

or thicker, and being as broad, will do that work as well as the breast Plough, and with five-fold more expedition.

The Ingenious may soon make perfect this design, and bring it into use: I have made a Model which answers what I have proposed; and had I an assistant, should soon bring it to perfection: However these hints are sufficient to them, that truly understand the use of the Plough.

FINIS.

THE
Second Part
OF
Vinetum Britannicum;
OR, A
TREATISE
OF
CIDER.

By J. W. Gent.

LONDON,
Printed in the Year 1689.

Second Part

THE
OF

ALPHABET

TO THE

Second Part
TREATISE

C I D E R.
ALPHABET

H
to the making of Milk and a
ther of our British Drinks (1788)
Printed in the Year 1788
plain

The Preface.

THE
PREFACE
TO THE
Second Part
OF
Vinetum Britannicum.

HAVING formerly given you
an account of most of the
principal Things relating
to the making of Cider, and o-
ther of our British Drinks in a
H plain

The Preface.

plain and short Method, that it might suit with the Capacities of those that are usually imployed in those Rural Exercises: There now remains some few Observations and Experiments, which may serve as a supplement to that Treatise for a farther improvement of these Curious Liquors, (especially Cider) and may probably be a help to those that imploy themselves sometimes in endeavouring their Melioration.

Many have attempted to improve them, but for want of a right apprehension of their Natures, have been frustrated of their Expectations: And when they have been mistaken in the cause of the Defects in making these Liquors, instead of rectifying, have made them worse; That when they have sometimes

The Preface.

times made a Vessel of Good Cider; it may be rather imputed to chance than skill. So that the most Ingenious made many years Observations before they could rightly apprehend the natural and most regular Method of making it: For since the publishing of the former Part of the Treatise of this Subject, the experience of several Years, hath not only given me cause to correct several Mistakes in my former; but capacitated me to prescribe in the Second Part a New Method of making the best Cider that Apples are capable to yield; Besides many other very necessary Observations and Experiments relating to the several Matters before treated of.

In this Second Part I hope to remove such Remora's that have

The Preface.

been laid in the way, by great Pretenders, whose authority in matters of this Nature, have wrought so far on very many Ingenious (though credulous) Operators on this Subject; that after many trials they failing of their desired success, it hath caused them to despair of obtaining that certain way of making Good Cider, so seemingly plainly by them set forth, whose Aphorisms and Rules (had they proved always true) had doubtless raised this Liquor into a great deal higher Reputation, than now it is amongst the numerous Planters, which have been, and are very much increased by the confidence they have put in what they have read and heard, and the Encouragements they have received from those that have sometimes hit the Mark.

The Preface.

Mark: Wherefore to undeceive and gratifie the Curious, and such that are willing to promote so good a Work, as the Improvement of so great a part of our English Husbandry, and to better inform those that spend so much time, pains and expence in fruitless Experiments, and in compounding and corrupting, instead of meliorating ill made Cider; I shall herein discover the true Nature of this Liquor, and the right Method of making it cheap and easie to the Operator, delightful to the Eye, pleasant to the Palate, grateful to the Stomack, healthful to the Body, and durable to the advantage of the Good House-keeper, who may have of it in its purity and primitive Sweetness, not only throughout the Year, but for many Years after it is made.

H 3 . The

The Preface.

The right understanding of which Method, may be an encouragement to the Gentry and Yeomanry of the Northern Parts of this Kingdom, who now value the Cider of Hereford-Shire to them carried at a costly Rate, above French Wines; That they may of their own Fruit make Cider equal to the best of Hereford-Shire, They may now try this Prescript with their lesser quantities, which proving right, will beget an emulation amongst the Good Husbonds, who shall have the fairest Plantations, and amongst the Good Housewives, who shall have the best Cider. I need say no more here, but refer you to what I shall write in the following Tract, where I shall freely impart what I have observed, and not (as is too usual-

b

The Preface.

ly done) conceal that which most conduces to compleat the intended design, lest another should partake of the same advantage. If the Operator finds not at first what he expects, He must impute his Error to his own Mistakes, and not condemn so regular a Method, nor Censure the Author,

J. W.

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CHAP.

CHAP. I.

Of Drinks in General.

IN the first Part of this Treatise, I have given an account of such Subjects or Materials, out of which Drinks or Liquors are extracted or prepared: As of the Sap of several sorts of Trees therein mentioned; and particularly of the Birch Tree, the Sap whereof hath been in great esteem, not only for its Pleasantness, but its singular medicinal Vertues. It hath been also observed, that the Sap of the *Sicamor*, is a very clear and sweet Liquor; And that several other Trees yield plenty of *Sap*, which far exceeds common Water, either for the making of *Mead* or *Ale*. The *Vine*, if planted for no other use, would certainly by cutting the Branches in the Spring, yield a great quantity of delicate

*Sap of
Trees.*

delicate Liquor. The Saps of the *Elder*, *Elm*, *Oak*, &c. are well esteem'd for their Medicinal Vertues. The Walnut Tree, and the Bramble, yield plenty of Liquor by cutting, which doubtless are not without their Specific Virtues.

*Juices of
Fruits and
Berries.*

Of late it hath been proved that *Quinces* yield a delicate Wine, surpassing most Drinks: *Peaches* also and *Apricocks*, by some are made to yield pleasant Wines. Of the Whortle-Berries that grow on the smallest of Shrubs, is made a very fine and pleasant Drink.

Of Roots.

Some have pressed a Juice out of contused *Carrots*, and found the same to be a pleasant, sweet Liquor; but this hath need of some farther enquiry into, and experiment to be made of it.

C H A P. II.

That the Juices of Fruits, are the best of Drinks, and Universally Celebrated.

SOME, and but a small part of the known World, please themselves with the excellency of Drinks, made by the Tincture of fermented Grain: But the most part, and those we conclude to be the wisest and most ingenious, extract the long digested, and pure Liquor, from Fruits proper and natural to the Countries they Live in; esteeming it to conduce more to Health, Pleasure and long Life, than other Drinks. A learned Author of late in his praise of Wine, attributeth these virtues or qualities to it, *viz.* That it nourisheth more than any other Aliment; That it corroborateth human Strength; That it openeth Obstructions, and comforts and exhilarateth the Spirits: That the use of it in all tempers, is most *Natural Aliment*;

The excellency of wine.

ment; and in all Distempers, as proper Medicament. The nature and excellency of this Nectar, was so high in the Opinion of Noah, that he made it his first Art of Husbandry after the Deluge, to plant a Vineyard; The vertue and moderate use of the Juice whereof, may be supposed to be the cause why his Age extended twenty years above the Age of Adam; and three hundred and fifty years after the Plantation of his Vineyard. Drinks extracted out of Grain, and other compounded Drinks being then not in use; nor hath the use of them, since their Invention rendered their Drinks so Healthy and Long-lived, as the Spirituous Juices of several Fruits, especially of the Vine and the Apple-Tree.

But because these Wines that are endued with these Vertues, must be imported from the places of their native growth; and do suffer so sensible a deprivation of their excellency in all respects, that they may be compared to the Drugs, transported from Cochinchina to Italy by Barri the Jesuit, which as he relateth were so altered in their Transportation, that without a special Script

Script upon them, he could not have known them to be the same, either in Vertue or Colour: And certainly these Liquors must much more suffer, than those more solid Materials; The frequent Fermentations, Boilings, Frettings, &c. of these, in their being moved and tumbled from place to place, and through divers Climates subjected to the variety of *Airs*, causing an expence of their more spiritual and better parts; and a precipitation of their more solid and delicious, which are the most nutritive; so that in effect we have but the Phlegmatic Part deprived of its principal Vertues; And that part too, oftentimes corrupted with the *Coopers* or *Vintners* Art, to make it palatable and durable, that it becomes ungrateful to Nature, and injurious to Health and long Life, which evidently confirms our next Position.

CHAP. III.

*That Cider and other Juices of
our English Fruits, are the best
Drinks for this Country.*

*The Anti-
quity of
Cider.*

THat Cider hath been of ancient Use in this Kingdom, and that the name of Wine was attributed to it, I have lately met with a farther Confirmation in a small Tract, entitled *Fragmenta Antiquitatis*, being *Ancient Tenures of Land*, published by T. B. of the Inner-Temple Esquire, Anno 1679. Wherein there is an account of the Mannor of *Runkham*, in the County of *Norfolk*; that the Tenant held the same of the King in *Capite*, by the Service of two *Mues* of Wine made of *Permain*s, to be paid into the *Exchequer*, yearly at *Michaelmas*. This Service was reserved in King *Edward* the firsts time, about four hundred years past; whence may be noted, That the *Permain* is an ancient English Apple, and that it al-
ways

ways was esteemed one of the best of Apples, and yielded one of the most delicious of *Ciders*. And its probable that as foreign Wines became here more in use, that Husbandry of propagating Remains decayed, the Trees being slow of Growth, and small Bearers, which might probably be the cause why this Wine was reserved to the Kings use, more than that of any other Fruit; it being more rare and delicious.

Cider made of Mature Fruit, regularly extracted, and naturally prepared, detaineth its corroborating and exhilarating Spirits, and its nutrimental Sweetness, that its Vertues far exceed those of the transported Wines; and may almost compare with many of those Wines in their proper Countries. Of this matter we have said enough in the first Part of the Treatise of this Subject; and shall therefore hasten to the true and regular way of preparing this most *inestimable Drink* from the *Soil* to the *Fruit*, and thence to the *Liquor* in the *Glass*, fit for the most *Curious Palate*; together with the several other *Drinks*, that are most desirable by the ingenious Enquirers into these things.

I

CHAP.

The excellency of Cider.

CHAP. IV.

*Of the best and most expeditious
ways of propagating the several
sorts of Fruit-Trees.*

*change of
Plants an
Improve-
ment.*

AS Fruit-Trees, some of them do effect one sort of Land, and some another; and that Judgment is required for the placing of these Trees in their proper Soils wherein they most delight: So do some Species of Trees, grow weary of the Soil wherein they have been long planted, and do after some time degenerate, as several sorts of Grain do, when often sown in, or near the same place; and some Plants do the same, if planted often on the same or the like Ground: The usual remedy in such cases, hath been to change the Seed, fetching it a far off, and by procuring other Plants from another Soil; as in *Wheat, Strawberries, &c.* is generally observed. After the same

same manner, in case it be observ'd that Trees that have been planted and propagated in a Soil wherein they have delighted, do by frequent grafting and raising of the same Species in the same Soil, degenerate. Your surest remedy then will be to procure Grasss or Plants of the same Fruits from another Soil; as formerly the Grasss of the *Kentish Pepin* were brought out of *Normandy*, and it proving to be a good change of Soil, they prospered exceedingly for many years; yet now it is observ'd that the Trees are more subject to the Canker, and prosper not so well, nor is the Fruit so good as formerly it hath been; Therefore have some ingenious Men, either already obtain'd, or shortly intend to procure fresh Grasss from *Normandy* to renew that Kind, not questioning the success to answer their expectations.

It is observ'd that *Horses, Sheep, &c.* thrive best on Marshes that lye near the Sea, usually called the Salt Marshes, by reason of their Brackishness. *Bees, Pigeons, &c.* thrive best also where they can come at the Salt and Fresh-water;

*Brackish
Land good
for Fruit:*

Fish are very much improved in a Brackish Water: So are many Vegetables likewise; and in particular Apples growing on brackish Grounds near the Sea, yield a more rich and vinous Cider, than those that grow more remote; and those the poorest of all Ciders that grow on sandy Lands, which attract most of their juicy Substance from the Rains, although they are all of one Species. The Trees on such barren Lands, yielding plenty of Fruit in wet Summers, and few in dry, for want of that Nourishment which rich Lands furnish the Trees withal: Therefore those that have Lands lying well near the Sea, may promise themselves better Cider, than those more remote.

Newly recovered Lands not good for Fruit. Their remedy.

Nevertheless Land newly recovered from the Sea, whilst the Salt remains too much in it, is not good for Apples: But if it be cast in small Hills that the Rains may wash the Salt from it, and this labour often reiterated until the Soil be moderately sweetned, and the Trees planted shallow in it; questionless they will then thrive, and if you can bring them to grow, you need not doubt the excellency

Of Propagating Fruit-Trees. III

lency of their Fruit and Liquor; And a better help to such Lands cannot be than a mixture of sweet Earth, fetched from above the taint of the Salt-Water, with your Salt Land: Nor can you better improve the poor sandy Orchards, than by laying near the Roots of your Trees, Salt Clays or Earths, or other saline Matters in case the Sea be near.

Besides the *Codlin* and *Gennet-Moil*; there are several *Sweet-Apples* that may be propagated by *Cions*, *Slips* or *Cuttings*, whose use in mixing with other Fruit in making *Cider*, shall hereafter in this Second Part be treated of. The raising whereof is the more to be encouraged, by reason the way is easie, and the Fruit coming to maturity about the time of the *Redstreak*, becomes very useful in mixing with them as hereafter is shewn: There is an other curious *Cider-Fruit*, that may be easily raised by the same Method as *Codlins*, which by meer accident I have discovered; but I cannot give you the Name of it, unless it be that which is usually called the *Spice Apple*, being to me a new Species, and came among my *Codlin-Slips* by accident.

Sweet Apples raised of Cions.

112 *Of Propagating Fruit-Trees.*

*The Quince
a Vinous
Fruit.*

Such hath been the scrutinious Nature of Man, that he hath scarce left any Fruit unattempted, to extract its Blood for his use or delight: For the *Quince*, an austere Fruit, and of ill Savour, hath been found by expression to have yielded a very excellent Wine. Therefore in moist and rich Lands, the propagating of Quince-Trees ought to be encouraged: Its said, that in that part of the *Western Continent* now called *Carolina*, there grow such vast quantities of this Fruit, that they make very much of its Wine.

*Whortle-
berries
yield wine.*

In the Heathy Parts of *Surrey, Hampshire, Sussex, &c.* grow great quantities of Whortleberries, usually called Whorts or Bilberries, of which is made a Wine inferiour to none of all the Artificial Drinks, that are extracted out of Fruits, being delicately tasted, and of an excellent Colour.

*Planting
Trees on
shallow
Land.*

If your Ground be shallow, either Sandy, Chalky, or Stony, Plant your Trees near the Surface, and lay store of Mold or Earth about them, for about

about five or six Foot round the Tree, that they may seem to be planted Deep; that they may well be defended from Drought, and the Roots will naturally incline downwards, and the Trees thrive as if planted on a deeper Soil.

Many have attempted to raise Vines after the manner of the French in Vineyards, and have had good success in raising them; but the Fruits (however the Vineyard hath been posited or situate) have not answered the Planters expectation, not being so mature as those that are planted against Houses, Walls, or the like; by reason that the Air moving too and fro, incessantly refrigerates the Vine in the Spring, preventing its early Budding in the Summer, the early Blowing of the Grape; And in the Autumn, the ripening of the Clusters; so that let the Vineyard be planted against any South declining place; yet the cool Air moves through the open interspaces of the Vines, and Leaves, that rarely our Summers are hot enough to qualify it without somewhat of Art to be used. Therefore if thin,

The most probable way to raise a Vineyard.

low Walls of Brick, or the like, of about three or four Foot high, were built the length of the Vinyard from East to West at a convenient distance, that they may not shade each other; and the Vines planted against them, at the same distance and height as in Vinyards; it would not only break the cool Breezes, but add to the heat of the Sun; especially if the Ground before them be kept bare: But lest this way may be too chargeable where Bricks are dear, it may be much cheaper to drive in a strong Stake, or two slender Stakes at the back of each Vine, of about four Foot high above the Ground, to which about the time the Vine begins to spring, you may add a thin Board of about twelve Inches broad, or two Boards fixed together, making about eighteen Inches broad; against which you may tack your Vines and prune them, as in the first part of this Treatise is directed, only you need not turn them Archwise. These Boards will break the Winds, and keep the Grapes warm after the Sun hath left them: Then after your Vintage is over, you may lay the Boards on heaps to keep

keep them from Rotting till the Spring: The Stakes may stand for many years if they are of Oaken Spine: The charge and trouble will not be great, if you consider that your arched Props soon decay, and the constant annual Charge and Trouble the Planters of Hops are at, in renewing their Poles, and preserving them in the Winter; much greater than this can be in continuing these Boards, which lie in a little room, and endure many years ere they decay.

If your Ground be so fertile, that your Vines grow too rank, and Weeds encrease too fast; then may you lay Sand near, and before your Vines, thick enough to suppress the Weeds, which will very much add to the heat of the Summers Sun, and thereby accelerate the maturation of your Grapes; and also abate the too great fertility which much of our English Soil is subject to; for the meanest dry and warm Land (so that it be not barren) is fittest for a Vinyard: *Bacchus amat colles.*

Many of our best Fruit-bearing Trees, are subject to that pernicious Disease the

*The most certain
Cure of the
Canker in
Trees.*

the *Canker*, which in many places destroys the whole Tree; And notwithstanding all the Cuttings, Parings and Plaistrings that can be used, yet every new Shoot will be tainted with this Disease, as it hath happened to me in many of my best Fruits; and more particularly in one Tree that I most valued, which the Canker had yearly so defaced, that for eleven Years together I had cut and pared its Wounds, that it was little the bigger in its growth, and had in all that time born only four Apples. In *February* 1682, I was willing to try some new experiment towards the Cure of that Disease; and having considered that the Land it grew on, was rich and light; and that in many places I had observed Trees to flourish in Courts and Yards, where the Soil was of the same Nature, and the Ground pitch'd or pav'd with Stone; I therefore caused the Earth to be taken away round my little, but diseas'd Tree, about four Foot from the Stem, and about five or six Inches deep, and in the room thereof caused Stones to be set very close and near together in Dirt taken out of the High-ways instead

stead of Sand, after the same manner as Yards or Streets are paved.

The Tree thus paved round, in the Summer following emitted many fair Shoots; and in Autumn 1683, yielded above fourscore fair well grown Apples, and increased in clean Branches, more than it had done in seven Years before, without the least touch of its old Disease, and most of the old Sores were also skinned over, having first a little cleansed them. In the Year 1684, this Tree continued in its flourishing and healthy Condition, encreasing as before in its Branches; that to check its too great aspiring and spreading, I was necessarily forced to cut off the Tops of many of the new Shoots: Its Branches were also so laden with Fruit, that to preserve them and the Tree, I caused Props to be set to support several of them; which strange effects were so evident, and conspicuous to many, that knew the former state, and after saw the amended condition of the Tree; that they were sufficiently convinced, that the laying of those Stones were the very cause of the cure; and I am the more satisfied in my Opinion that
it

it was so: For that in the Year 1684, in the same manner I abated Earth from several other Trees infected with the like Disease, and applied (for cheapness sake) a proportionable quantity of Chalk, and ram'd it fast about the Trees, which hath produced near the like effect, as was from the paving with Stone; but I as yet question whether it will have that duration as Stone, so as to continue solid, it being apt to dissolve, and degenerate into Earth.

For it is the depression or detention of the *Spiritus Mundi*, or the true fertilizing Spirit in the Earth, about the Roots of the Tree, that those Roots may the more plentifully attract it; and the prevention of other Vegetables from extracting and wasting it, that is one principal cause of the prosperity, and fertility of the Tree so paved about: For the more of this true nitrous and vegetating Spirit there is, and the less of the Crude and common Water, the more fertile and healthy will the Tree be. This Experiment I hope will be of general use and question; not but it will succeed in most places where this Disease is common,

Never-

Nevertheless, after all this care, there will remain some Fragments of the old Disease, it being so confirmed in the stock, that it will never be clean out of the Branch; like unto the *Lues Venerea* in some Animals: For if a Tree be infected with this Disease the Canker, although you graff a sound Graff of another Fruit on the stock, and leave but a few Inches of the Cankery Tree above the old stock, that small part shall infect the new Graff, and all its Shoots: But however this Method of mine hath had much greater effects in the Cure of that Disease, and is more certain than any other yet publickly known: And the same Tree I so cured, continues in a very flourishing condition to this present Year 1688.

CHAP.

CHAP. V.

*Of making Cider and other Li-
quors, of Apples and other
Fruits.*

Notwithstanding many have been so fortunate as to have a fair Plantation of Fruit-Trees, and those also very fruitful; yet have they not had *Good Cider*, (unless sometimes by accident) either for that they have gathered their Fruit before it hath attained its due maturity, for the Juices of Fruits are best improved in their own proper Vessels, (their skins) as Grapes the *Vignerous* of all foreign *Vinyards*; let them hang on the Trees till the stalks begin to shrivel next the Branch, that being a sign that the Fruit receives no more nourishment from the Tree: And in the *Canaries* whence our best Wines come, they let them hang longer. Likewise *Normandy Cider* is generally sweeter and better

better coloured than the *English*, by reason of the through maturity of the Fruit. Therefore it is best here to let your Apples hang as long as conveniently they can: For when they begin to drop naturally, its a sign they receive no more nourishment from the Tree; or if their Kernels be black, their colour change, or their scent be high, they may be ripe enough to gather: But *Deux-Ans* and other hard Fruit, may be gathered in a dry time, in *October*, lest the Frosts impair them: Notwithstanding they have not those signs of maturity, that other more early Fruit usually have.

Time for
gathering
Apples.

Some Apples retain a white colour till they are through ripe, as the *White Beling*, *White Wine Apple*, some sorts of *Pepins*; &c. some also are yellow before they are through ripe, as the *Orange-Apple*, *Golden-Pepin*, *Kirton-Pepin*, &c. their scent doth not always indicate the time of their maturity, several Winter or late ripe Apples not obtaining such scent or fragrancy, until they have lain some time on Heaps, or in large Vessels, where they perfect their maturity by their acquired heat, more than they could do on the Trees.

The

Laying
them on
Heaps.

The best way therefore is after your *Apples* are gathered off the Trees, to lay them on Heaps, or put them in large Vessels in a dry place, and let them there remain two or three Weeks, more or less as the *Apples* are in maturity, which concocteth their Juice, and very much improveth it, and washeth the more phlegmatic parts of the Fruit by sweetening; and also (by a degree of purification) weakneth the *Branchery* or *Veins* that unite the *Parenchymous* parts of *Apples*, especially the more tough sort of *Deux-Ans*, *Westbury Apples*, *Leather-Coats*, *Oaken-Pins*, &c. making them to be more easily broken in the Mill, and more freely yield their Juices: For these tough and harder sort of Fruits ought to lie till the end of *November*, or till *December*, before their Juices be thoroughly mature, and their *Parenchymous* parts made soluble; and then will these Fruits yield you the *finest*, *strongest* and most *spirituous Cider* of any other: Their *Juices* having been longer from their first formation on the Tree, to their dissolution in the Mill, in a continued state of digestion and conction, than other softer Fruit.

It

It is also observable, that the more difficultly Apples part with their Liquor in the Press, the thinner it is, the sooner it becomes fine, and the more it encreaseth in *beauty*, *colour*, and *strength*: Therefore Apples easily yielding great quantities of Liquor are not always to be desired, by those that affect the best Cider.

Some have pretended an indifferency, whether their Apples have been rotten or not, supposing that their Cider made of Fruits part sound and part rotten, is of equal goodness to that which is made of all sound Fruit; and others have esteem'd that made of rotten Fruit only, to be the best. But neither of these certainly ever made any very good of sound Fruit, for if they had, they would without doubt have altered their opinion. For Apples having lain over-long on heaps till they are pulpy, and part rotten, will yield a thick Juice from the Press, difficult to be separated from the *Murc*, which will be long before it be fine, and much of it will be wasted by reason of the great quantity of the pulp of the Apple that will be pressed out

Apples over-ripe or rotten, make no good Cider.

K

with

with it, and must be separated from it. And then the *Cider* will not be so good as that made of sound Fruit well ripened. Therefore the middle way is the best, as hath by experience been observ'd.

Of the ci-
der-Mill.

Next to the gathering and hoarding of your Fruit, the grinding them is to be considered. No *Mill*, *Engine*, *Art*, or *way*, having been yet used or discovered, better than the *Mill* described in my former Treatise of this Subject for the expeditious, easie, and even grinding of Apples, the *Mill* being easily portable standing in little room, and of small price, considering the quantities of Apples that in a little time may be ground by it. One Man may grind in this *Mill* of the *double Roll*, in one day, as many Apples as a Horse can in a Horse-Mill in three days. This *Mill* costing from 3 *l*. to 10 *l*. and a Horse-Mill from 20 *l*. to 30 *l*. with the room it is to work in, This taking up no more room than an ordinary Chest, and may be easily removed as occasion requires. The other must remain always fixt.

This *Mill* grinds the Fruit even, bruising every part, yet breaketh not the Kernels.

Kernels. The other grindeth it unevenly and breaketh the Kernels which prejudiceth the *Cider*. These new Mills of both sorts were made of several prizes, as you would have them for dispatch, by Mr. *Henry Allen* at the *Cabinet* in *Exeter street* near the *Strand* in *London*, and now by many other ingenious Work-Men.

After the Apples are ground, if they were very mellow, it is good to press the pulp the next day, lest the too long standing occasion heat and an ill flavour, and the Liquor not so easily separable from the *Feces* or *Marc*, which will then strain out with the Liquor.

*Ordering
the Pulp
after
grinding.*

But if the Apples were tough or hard, the long standing of the Pulp dissolves the more obdurate Particles, weakneth the Branchery or Veins that pass through the whole fleshy part thereof, by a certain and advantagious degree of putrefaction, which makes it yield its Liquor the more freely, and is in some degree a maturation of it, aswell as whilst it was in the whole Apple; also the long standing of the *Pulp* after it is ground, gives the *Cider* a better tincture than otherwise it

K 2

would

would have, which it attracts from the *Pill* or *Skin* of the *Apples*.

For the redness of the *Skin* in the *Pulp* lying long together with it, gives a tincture to the *Cider*, as doth that of *Grapes* to *Wine*. For the Grape whereof *Claret* is made, yieldeth a pale *Wine* as soon as it is pressed; but suffered to continue some days on the red *Husk*, obtains the tincture it hath when brought to us.

Of the
pressing of
Cider.

As to the pressing of *Cider*, although the greater *Skrew-Presses* make the quickest dispatch, and press the hardest of any, yet for private Families they are chargeable and cumbersome, nor is it necessary to make so hard a pressure as is usually made by them. I have seen a Press made with an *Iron-Skrew*, that by it the Juice hath been so clean expressed, that it left the *Murc* almost dry enough to burn. There was at that place *Cider* made of *Redstreaks*, *Golden-Rennets*, *Golden-Pepins*, *Gilliflowers*, and other of the best of *Cider* Fruits, and specifically each by it self, a *Hogshead* at least of each sort. But by reason of the too fine grinding and extream dry pressure, the most curious *Palat* could distinguish
but

but little difference in the Taſt, which was none of the beſt in every ſort. It was alſo ill-coloured and very cloudy ; the laſt and much enforced Juice being very poor, and carries with it too much of the lignous part of the Apple, which had been more proper to have been left behind. For as all vinous Fruits have their pureſt part next the Skin or Pill, ſo is their richeſt Juice there contained, the *Sun* and *Air* maturing ſuch Juice more perfectly on the extream parts than near the Core. The Pores are alſo much finer there than towards the middle, as appears in a diſſected Apple with the help of a *Microſcope*, which is the reaſon that Wines proceeding from Grapes without much preſſure, are preferr'd to thoſe that are more preſſed, and the pooreſt Wines are thoſe that are with the greateſt force extracted. All which conſidered, it is better to have nine parts of pure rich *Cider*, than ten of that which hath neither good Taſt nor colour. Therefore ſo great a Preſs is not abſolutely neceſſary in the making of good *Cider*.

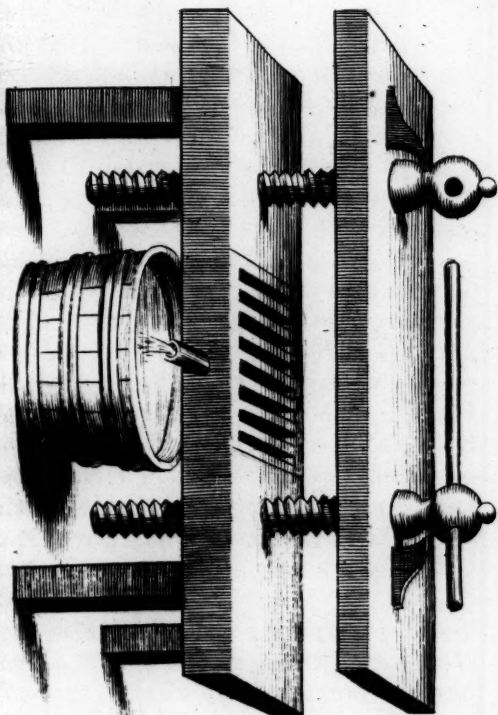
*Another sort
of Press.*

As one of the conveniencies of the Mill is to stand in a little room, and to be portable with ease from one place to another; the same is necessary in the Press, which may be made with two wooden Skrews, of about the size of the Skrews which the *Apothecaries* use in extracting Oils, &c. which have a very great force or power with them, and placed at about 30 or 36 Inches distant, on a Bench or Form of about 20 or 24 Inches in breadth, according to this Figure.

The smallness of the Thread of the Skrew, although it requireth more time to work it, maketh it press the Mure much the harder; but you must remember to fix the lower plank to some Post or Wall, by pieces extending from thence to the Press to keep it steady; with this may you press any quantities, small or great at any time without much trouble; it is easily made, and requires but little room. And after your Vintage is over, you may set your Press as well as your Mill, in some by-place, till the next Season requires its use again.

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The Figure of the Cider Press.



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The Principal Cause that there hath been so much bad *Cider* made in most parts of *England*, was the too early stopping of it up. It being usually prescribed, and as usually practised, that as soon as *Cider* is pressed, strained and fermented, they stop it close, with a very great confidence that unless it be close stopt it will decay, and become of no use. So that when these *Ciderists* have taken care for the best Fruit, and ordered them after the best manner they could, yet hath their *Cider* generally proved pale, sharp, ill tasted, &c. and all from the too early stopping of it. For the stopping of *Cider* close before it be fine, or with its *Feces* in it (although precipitated) begets reiterated fermentations, which fermentations very much impoverish this Liquor, by precipitating those Particles which enrich it with *Tincture* and *Gust*.

Ordering
of Cider
after it is
pressed.

Whilst its gross *Feces* or any settling remain in the bottom, every change of Weather causes some motion therein, which is usually termed Fermentation : This doth so attenuate this Liquor, that it easily letteth or suffereth those Parti-

cles to subside, and leaveth the *Cider* thin, jejune, acid, and ill tasted. It is thin and jejune, because it hath lost its substance; acid, because it hath lost its sweetness, those Particles being the Saccharine substance, or part of the Apple, and of ill savour and gust, because those Particles when precipitated, being mixt with the more gross, do putrifie and heat, infecting the whole mass in the Vessel, all which effects are apparently obvious in *Cider* made after the Vulgar method. These *Feces* they are that cause the Corks to fly out of the Bottles, or break the Bottles; or at least the opening of them makes the *Cider* fly, and mixing with it make the residue unpleasant.

The various Arts, used in making of Cider.

These things being generally taken notice of, hath set many heads at work to provide remedies. Some have made use of many ways to ferment it, and make it clear by reiterated Fermentations; others by additions, as *Ising-glass*, &c. have enforced a precipitation; and when they have so done, finding it to be thin, pale, and acid, have by *Molasses*, *Treacle*, or *course Sugar*, given it body, colour, and gust. What delight or pleasure there can

can be in drinking such Compounds; or how much this must conduce to health or long life, I leave every unprejudiced and ingenious Man to judge.

There are others that when their *Cider* is thus reduced to a jejune and an unpleasant Drink, they take one Vessel, and with an Alembick extract its Spirit, and add the same to another under the same circumstances of poverty and unpleasantness, and then edulcorate it with *Molasses, Treacle, &c.* which also gives it tincture. These and many other Arts are used to sophisticate, corrupt, and debase, this otherwise pleasant and wholesome Drink.

To prevent not only the decay of *Cider*, but the extraordinary trouble in curing and amending it. When it is pressed let it stand a day or two, or more, in an open Tun, or covered only with a Cloth or Boards to keep it from the dust, or in a Hogshead or other Vessel, not quite full, with an open Bung, till the more gross parts subside: Then draw it into Pails, and fill it up into the Vessels you intend to keep it longer in, leaving about an eighth part empty. Set these

*Rules in
making
good Cider.*

these Vessels in your coldest Cellars or Repositories, with the Bunges open, or covered only with a loose Cover, that there may be a free perspiration of the volatile Spirit of your *Must*, which would otherwise force its way; and that your *Must* may be cool, and not kept warm, lest it ferment too much.

Thus standing open, and the more open the better, it will by degrees let fall its grosser parts, and in time become clear without the loss of any of its true and durable Spirit. For coldness is here the cause of its purifying, warmth occasioning the solution and detension of those Particles that spoil the colour and taste of *Cider*, and which otherwise would precipitate.

As for the time of its standing open in the Vessel, it varies according to the nature of the Fruit; If the fruit were mellow or sweet, the more of the gross particles be pressed out with the Liquor, the longer time will be required for their precipitation: But if the Fruit were hard or sharp, the thinner doth the Liquor issue out of the Press, and the sooner will your *Cider* become fine; and you must be sure to observe, that as soon

as

as this *Cider* of hard Apples is fine, you draw it off from its precipitated Lee, lest it become acid, or acquire some ill taste from it.

This standing open of the Vessel causeth an expence of that wild or volatile Spirit, which being pent in, would beget a continual fermentation much prejudicing the *Cider*; and in case it doth not otherwise work its way out, would in time break the Vessel that detains it.

After your *Cider* hath stood open some reasonable time, till it is become indifferently fine, which it may be in three, four, or five weeks; then will it be convenient to draw it into Bottles, if you have a sufficient Stock, or into other Cask, that it may there become more fine. For after it is separated from its gross *Feces*, it will more easily demit the remaining Particles or flying Lee, than it would have done whilst the grosser parts remained, renewing its fermentation on every change of Air, or other accidental occasion.

Its fineness will sometimes plainly appear, if you move the scum aside with a Spoon

Ordering
of Cider
in the first
Racking.

Spoon, or the like; but to be more exact, you may take a Glass-Pipe of a Foot or more in length, open at both ends, stop the upper end of the Pipe with your Thumb, and let the other end down into the *Cider* as deep as you think fit, then open the upper end by removing your Thumb, and the *Cider* will rise in the Pipe: Then stop the upper end again with your Thumb, and take out the Pipe, and hold it over a Drinking-Glass, remove your Thumb, and you may there discern the state and fineness of your *Cider*.

If your stock of *Cider* be not overgreat, or that you are willing to preserve your choicest sorts of *Cider*, the best way is to have large Glass-Bottles of one or two Gallons apiece, more or less, enough to receive the same, into which draw off or rack your *Cider*, and let the Bottles stand open, or but barely covered in your coolest Repository for a month or more, till you observe your *Cider*, by your interposing it between a Candle and your Eye, to be very transparent, which then may be called Superfine, the remaining Particles or flying

Lee

Lee being precipitated and settled in the bottom of the Glass-Bottle.

If your quantity of your choicest Cider be too great for your Bottles, you may instead of them make use of Stone-Bottles, or Jarrs, or Stounds of Flanders-Earth, or glazed Earthen Vessels, the larger the better, which may be placed in Rows in your Repositories, Cellars, or Vaults, and covered with Boards, or the like, to preserve your Cider from dust, &c. but not from the Air. But by reason that you cannot so easily discern the fineness of your Cider in these as in the transparent Vessels, you may now make use of your Glass-Pipe before-mentioned.

The reason why Glass-Bottles, or other glazed or stony-Vessels are more fit for this second fining, than those of Wood, is, for that the coolness of the Vessel very much contributes to the precipitation of those remaining Particles that would otherwise debase this excellent Liquor.

But if your quantity of Cider be so great, that these Vessels cannot receive it, then may you rack it into other Vessels made very clean, dry, and sweet, and suffered

suffered to stand slightly covered till it be very fine, before you stop it up. If you find that your Cider doth not fine in wooden-Vessels so soon as you desire, for want of that coldness that is in the glazed-Vessels, you may take Flints or pebble-Stones clean and dry, and put them into your Cask of Cider, this is said (and with great probability) to contribute much towards the nimble precipitation of the *Feces*. The like effect hath the applying of a bag of Salt to the outside of the under part of the Vessel.

*Ordering
of Cider
after it is
super-fine,*

When your Cider hath attained its utmost degree of fineness, which after this way of ordering it will do, if you have but patience to let it stand open long enough, although some will fine in half the time that other requires: Then take your Glass Syphon or Crane and draw it off from its last *Feces* into smaller Bottles, wherein you intend to keep it for your use: Thus being drawn off, and thoroughly depurated, you may close-cork all your Bottles, and place them in your cool Conservatory, where after a few weeks standing your Cider will acquire a fine briskness, and mantle in the

Glass

Glass without any manner of feculency, and retain its first sweetness, and change from a pale to a lively Canary or Malaga-colour; but if you have occasion to accelerate its maturity, place so many of your Bottles, as you think you may have sudden occasion for, in some place warmer than your usual Conservatory, and it will soon answer your expectation.

Sometimes it will happen that the next Summer after it is become so pure, some Raggs or flying Feculencies may appear in your Bottles, which are occasioned by the warmth of the season begetting another fermentation from the fatness of the body of the Cider, made of the sweeter sort of Fruit, which are not apt to appear in the thinner Cider, but in some short time these will subside, and you may draw off the fine from the Feces with your Syphon, without any great prejudice to your Cider: These later fermentations in great quantities of Cider often spoil it for want of a timely prevention, which cannot be so well done in Vessels of Wood as those of Glass, where you may easily perceive the

the various changes that may happen in these Liqueurs.

To make
Syphons or
Crans.

These Syphons are best made of Glafs, but because that at the *Glass-houses* the Workmen will not presently apprehend how to turn them fit for this use; You may buy at the Glafs or Potters-Shops those Tubes or Pipes that are made of white or flint Glafs for *Barometers* or *Mercurial Weather-Glasses*, which may be carried in a long Case to any place in this Kingdom.

Make a fire of *Charcoal*, or such like clear fire at some distance from the back of the Chimney or Wall, and put the close end of your Glafs-Pipe into the fire, and when it is hot, dip about an inch of it in the water, and it will break off, then is your Pipe open throughout.

Then lay the Pipe across the fire (by a gradual access, lest the sudden heat crack it,) that for about five or six inches space near the middle it may be red-hot, yet so that the one end may be two or three inches longer from the hot part than the other: When it is thus hot, hold both ends of the Pipe, in each hand one end, bend it to the Form described

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Fig II

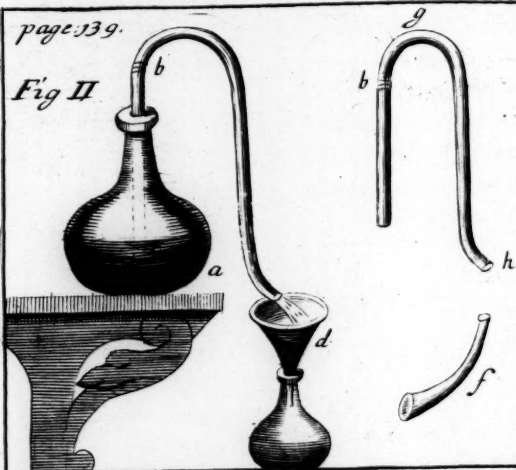


Fig II



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scribed at (g) then cool it (by a gradual taking it from the fire, lest the sudden cool Air break it,) and when it is cold enough to handle, put the longest Leg of your *Syphon* into the fire, and when it is hot turn it into the form as at *b*; but because the end will be too hot to touch with your hand, you may manage that end with a pair of Tongs.

As for the size of the Pipes let them not be of too small a bore, for then will the *Cider* be too long in drawing off: And as for the length, you may have of several lengths, that they may suit with your greater and lesser Vessels and Bottles, and as near as you can proportion the size of the bore to the length of the *Syphon*, that your *Cider* may flow faster out of the larger than out of the lesser Vessels.

The manner of using these *Syphons* is thus described: First place the Bottle or other Vessel out of which you are to extract your fine *Cider* from the settled Lee, on a Table or Shelf as at *a*.

The use of
the Sy-
phon.

Remember before you may use of your *Syphon* to whip about that Leg that

L

is

is to be put into the Bottle two or three turns or more of Yarn or Worsted, as at *b*, which may slide up and down as there is occasion.

Then put that end of the *Syphon* into the Bottle gently as deep as it will go, and move the Ring of Yarn to the very depth of the Bottle; then raise your *Syphon* so high as that the lower end of that Leg that is in the Bottle may be somewhat above the Lee that subsided in the Bottle, for which the Ring of Yarn will be your guide, as at *b. c.*

Then hold your Receiver, being the Bottle into which you intend to draw your fine Cider, and to preserve it, with a Funnel on it, as at *d.* Then whilst one holds the shortest Leg of the *Syphon* at *b.* let another suck at the lower end of the outward Leg, till he perceive the Liquor draw towards the end of the *Syphon*, then let him desist, and apply the Receiver and Funnel, as at *d.*

Or you may whip about the crooked end of the *Syphon* with Worsted or Yarn, and procure a short piece of Glass, Laton, or other Metals crooked, as at *f.* the one end being wide enough to cover the mouth of the longest Leg of the *Syphon*, which

which being applied to the *Syphon*, on the Worsted or Yarn, to prevent the Air from freely passing between, you may suck at the small end of the Pipe *f.* and when you perceive the Liquor to depend to the end of the *Syphon*, take away the Pipe *f.* and apply the Bottle and Funnel.

When you perceive your Receiver to be full, stop the mouth of your *Syphon* with your Finger, and apply another to it until all that is fine be extracted out of the Vessel from which you draw it, which you may perceive by your Glass *Syphon*, for you may gently sink the *Syphon* at *b.* with your Finger, till you perceive some Cloud or foulness to arise, and then keep it a very little higher, that it may come pure, whereby there will be nothing left in the bottom of the Vessel out of which you extract your *Cider*, but what is meer *Feces*, with very little wast; however you may pour out all the *Feces* into some other Bottle or Vessel, and let them stand until they are again settled, and you may then extract the fine as before, so that there may be almost no wast: Thus may great quantities of *Cider* be drawn off in a little

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time

time by two persons, when they are once set about it, and you will soon find the benefit of it.

An Error
corrected.

In the first part of this Treatise, I prescribed Fermentation to be a means to purifie *Cider*; and alledged that warmth was a principal help to provoke the same, as in truth it is: But such Fermentation that was at that time by many made use of, did very much prejudice *Cider*, and therefore to be prevented; There being no other Fermentation required in preparing the choicest *Cider*, than only exposing it to the open *Air*, that the volatile Particles may evaporate, and the *Feces* subside, which otherwise would beget a reiterated Fermentation, not only to the impoverishing of, but giving an ill Tast to that which otherwise would prove the best *Cider*. The subsiding *Feces* having an ill Tast and Smell, easily impart it to the *Cider*; as lately happened to one that by the advice of an ignorant *Ciderist*, after he had drawn off his *Cider* from the Lee or *Feces*, put the said *Feces* in a flannel Bag, usually called *Hypocrates his Sleeve*, through which the *Cider* finely distilled, and

and was very pleasant to the Eye, but not drinkable by reason of its ill Taste and Savour which it received from the *Fecqs*; so that in case the Cider so drawn off had stood long on those *Feces*, that Taste and Savour had infected the whole quantity, though not in so high a degree as it did the small part distilled through the Flannel.

Some persons have made great quantities of Cider, and at the same time have disposed it into several Vessels. But the Cider although alike at the tuning it up, yet at the drawing it forth, hath proved of different Taste and other qualities, which very much perplexed the curious Observators to find out the cause of such variance. At length they did observe that in all those Vessels that were made of the *white Oak*, the Cider was well coloured, and of a good Taste; but in those that were made of brown or red Oak, it was it contrary, so that they concluded the faults or defects of Cider to be from the Vessel. *Quere* Whether the upright Vessel whose Ribs are streight, being made of *Firre*, may not be very proper for the keeping

Of Vessels
for the
keeping of
Cider.

of *Cider*, it being probable that such tast and colour that may at the first be taken from the Firre, may rather mend than marr the *Cider*; however it will be sooner extracted from it than from the Oak.

Earthen
Vessels the
best.

As for Hogsheads or other Vessels made of Wood (when new) they are apt to ting the *Cider* with an ill colour, and give it an ill Tast; and when they have been used, although with the same sort of Liquor, they retain some tartarous matter which disturbeth the *Cider* newly put into it, and sometimes so much that the *Cider* will hardly ever be clear; therefore the less time that *Cider* remains in the wooden-Vessels the better it is: But to prevent such ill effects, Experience hath taught me, that open Vessels of Glasse, or glazed-Earth are the best, not only for the retaining the natural gust and colour of the *Cider*, but for the better and more expeditious purifying of it, having several times put small quantities of *Cider* from the Press, formerly in Jar-Glasses, and since that in glazed Earthen-Pots, which in the same manner hath rendred the *Cider* much

much exceeding that, which at the same time, and of the same sort, hath been put in wooden-Vessels and narrow-mouth'd Glass Bottels.

Therefore if you take Earthen-Vessels glazed within that will hold four or five Gallons each (more or less) as many of them as will contain the *Cider* you make, and set them in Rows on the Ground and on Benches in your Cellar or Repository, and fill them with *Cider* from the Press, and let them stand open, or but slightly covered four or five Weeks, or more, till the *Cider* be thoroughly fine, you may then Crane it off into Bottles for use; or you may by emptying one of the Vessels draw it from the next into that which is empty, and so go round till all be drawn off; and then let it stand another month without the Lee till it be Superfine, and then draw it off into Bottles for use. If you live near a *Potters* you may have these Vessels made with Tap-holes about two inches from the bottom, and so may with a Cane or small Tap draw it off without the use of the *Syphon*, and leave the *Feces* behind.

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These

These Vessels, all things considered, are cheaper than Barrels or Hogheads of Wood: First, for that you have more by the Gallon for your money of the Earthen than of those made of Wood; then will they last longer (with care;) for after the *Cider* is drawn off, you may scald them, and set them by, with their bottoms uppermost till another year, without danger of growing Musty, or want of hooping.

In the Cellar or Conservatory, they stand as in Figure 11; and when you have drawn off the upper Rows on the Benches, you may then set those on the Ground, and upon the Benches in the room of the other, and so draw them off likewise; you may have also two or three Rows the one above the other.

*Divers
Ciders out
of the same
Apples.*

Besides the observing of the time of gathering and grinding of Apples, which causeth a great Variety of *Ciders*; there is in the same Apple such a difference in its parts, that the one part produceth a better *Cider* than the other. In oblong Pears the best part is that which is next the tail, that being the smallest end, the whole

whole substance of the Fruit passing through it, is the cause why that part is the best. In Apples the outside is the best, being more maturated by the Sun and Air than next the Core, and there is the richest Juice contained; the Pores are also much finer there than towards the middle, as appears in a dissected Apple by the help of a Microscope. In Grapes the richest Juice is also next the Skin, and most easily expressed, which is the reason that Wines proceeding from Grapes, lying in large Vessels without any other pressure than their own weight, are much more excellent than those that are forcibly expressed, which by all are found to be the poorest.

Therefore if you intend to have a more rich *Cider* than is ordinarily made out of the same Apples, you may pare the outside of your Apples about the thickness of a Crown-piece of Silver, and grind these thick Kinds very fine (laying by the insides to make a meaner sort of *Cider*) by which you will soon find the difference, as well in colour as flavour.

But

*Diversly
coloured
also.*

But if you will have a rich coloured *Cider*, take of the reddest sort of through-ripe *Gillyflowers* in *November*, and pare about a third or fourth part of them you intend to grind as thin as an old Six-pence, lay these parings by, then grind your Apples and press your *Cider*; afterwards when your *Cider* is disposed of into its proper Vessels (of which the Glasse or Earthen are the best) add the parings you laid by, and let them remain in the *Cider* 14 days more or less at your discretion, and when your *Cider* is fine, draw it off from those parings; and although your *Cider* at the first seems not to have much of the colour of the parings, yet will it be so much improved by them, that in a few weeks its colour, gust, and flavour will excel that which shall be made by any other way or method; and the richer will it be if made of the Rinds pared thick, ground and pressed without the insides, as before is directed.

*An Error
in making
Currant
wine cor-
rected.*

In the first part of this Treatise, I intimated that by letting *Currants* hang on the Trees six or seven weeks after they
are

are red, would digest and mature their Juice, that it needed not that large addition of Sugar which otherwise it would do ; which I concluded to be true, because all or most of other Fruits become sweeter by hanging long on the Trees after they are ripe, as *Grapes, Cherries, Plums, Gooseberries, &c.* But now I have observed that Currants only by long hanging on the Trees, after they are ripe, become more acid. Therefore they ought to be gathered as soon as they are through ripe, if you intend to make *Wine* of them. But if you intend them for *Vinegar*, the longer they hang the better, and this is the best use their expressed Juice can be put unto, it making the best Sauces of any other acid Juices ; and its *Wine*, unless kept till the Sugar and the Liquor are thoroughly incorporated, is none of the most grateful to the Stomach.

Take a pound and a half of Loaf-Sugar, the finer the better, to which put three pints of Spring Water, and so in that proportion for a greater and lesser quantity ; set this over the fire until it boil, and after you have clean scum'd it, take

To make
Apricot
Wine.

take a pound of Apricocks through ripe to each pint of Water, pare them thin, and stone them, and put them into the Liquor, and let them be boiled therein until they become tender; then take the Apricocks out, and put a Sprig of floured Clary into it, and after it hath boiled a little take it out, and let the Liquor cool; and when it is through cold put it into large Bottles, and let it stand easily stopt till it be very pure or fine, then Crane it off into quart or pint Bottles as you please, and close stop and keep it for your use.

Note that the Wine is really a Sugar-Wine, and the finer the Sugar is the whiter will your Wine be; and it receives a very fine relish from the Apricocks, which yet remain firm and undissolved, and are fit for your Confectionary. The Clary gives it a Gust like Canary Wine: If you keep this Wine two or three years till the Sugar is perfectly dissolved or digested in it, it becomes one of the best of Artificial Wines. *Probatum est.*

After

After the same manner may you ting *Sugar-Wine* with *Rasberries*, without leaving the juice or substance of the *Rasberry* in it, which is apt to corrupt it. Or you may ting it or give it a gust with any other Fruits or Flowers.

To make
Rasberry-
wine.

I have formerly given you some account of the nature of the *Cacao*, with the manner of compounding of the Virtues of *Chocolate*: I have little more to add, but that several Authors of the *American Histories* have at large set forth the great Values that are set on the *Cacao* Nuts in those parts, being eaten without any preparation, satiating, and not cloying the Stomach. But much more on *Chocolate*, which the *Europeans* learned to make of the *Indians*, which they looked upon as the greatest delicacy for their extraordinary Entertainments, and which they offered to the *Spanish* conquering Generals, as the best Collations they could give them; and is of so common use there, that the *Spaniards* constantly drink the same in their Churches.

Of choco-
late.

Some esteem that which is made of the Nuts alone, made into a Past and dissolved

dissolved in Water; others with the Nuts made into a Past with Sugar, and so dissolved in Water, wherewith many Indians and Christians in the *American* Plantations have been observ'd to live many months without any other Food.

Its Vertues are very eminent in fortifying the procreative faculty; it preserves Health, and impinguates, causeth a good Digestion, is very Restorative in a Consumption, and is good in the Cough of the Lungs, Plague of the Guts, and other Fluxes, the Green-Sickness, Jaundise, and all Inflammations and Opilations, Sweetens the Breath, provokes Urine, Cures the Stone and Stangury, expels Poison, and preserves from all Infectious Diseases.

of coffee.

Coffee is a Drink so generally known, that I need say little as to the preparing it: The Berry is imported by the Merchants from *Arabia* and other Eastern Countries: The Berry or the Powder is to be bought at most *Coffee-Houses* in *London*. Its preparation is to mix an ounce of the Powder with a pint and half of hot Water which hath been boiled half away; after the Mixture it is to
boil

boil a while, till the water be well tinged with it.

Its Vertues are that it indisposes the Body to sleep, and so is good for those that affect late Studies: It allayeth the Heats and Fumes that arise from a full or foul Stomach, and so is good after a Debauch in eating or drinking: It is proper in Headaches, Dizziness, Lethargies and Catarrhs, where there is a gross habit of Body, and a cold heavy Constitution, and very effectual in opening Feminine Obstructions.

But to lean and active Bodies *Coffee* is not agreeable, nor good for uxorious Men, it incapacitating them for those pleasing Exercises Nature of it self inclines them to, and often renders the Drinkers thereof Paralytic, it being a kind of Opiat. Its said, the *Persians* drink it, to allay their Natural heat, that they may avoid the charges and inconveniences of a fruitful Family. So that taking its good and bad effects together, its good for nothing; but with Tobacco to entertain those that are at leisure to discourse about the Intrigues of the Town, and sometimes of the general Affairs of the World.

Its

of Tea.

Its preparation I have touched upon before: As for the Qualities and Virtues of it, I will add something to what hath been written in the first Part; it hath much of the same Vertue as Coffee, by inabling Men that drink of it, to Lucubrations or late Studies, by driving off sleep; yet without those ill effects that Coffee commonly produces; it makes Men active and lively, which Coffee doth not; It clears the Head, and opens the Urniary passages; it prevents Drunkenness, taking it before you drink Wine; for being drank hot, it fills the Veins and other vacancies, which otherwise would attract the Wine. Its a great dryer, and therefore no Enemy to Chastity. It removeth the Obstructions of the Spleen and Gall: It is good against Crudities, causeth a good Appetite and Digestion. It vanquisheth Dreams, easeth the Brain, and strengtheneth the Memory. These are the Principal, but there are many more Vertues attributed to this, the best of our small Water-drinks; and certain it is, that many ancient Men since the use of it in *England* have preserved themselves very lively, considering

ing their great Age by the constant use of this Drink, which is not to be slighted.

A late Author having written the Natural History of several Leaves and Berries, introduces Juniper-Berries to have many extraordinary Vertues, and directs that an ounce of them well cleans'd, bruis'd and mashed, will be enough for a pint of Water; when they are boild together, the Vessel must be carefully stopt; after the boiling is over, add a spoonful of Sugar-Candy; the effects are extraordinary in the Stone and Wind-Collick. The extract of this Berry is also commended in many other Distempers, of which almost every Physical Author Treats, and most of our Country Doctors prescribe the use of it.

Of the extract of Juniper-Berries.

Mum is not only become a common Drink in many places of this City, but a very wholesome Drink, and may without doubt be made as well here as in foreign Parts, we having all the same Materials whereof it is compounded. The Receipt is published in the before-mentioned

Of Mum.

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tioned

tioned Natural History, which he saith is recorded in the House of *Brunswick*: And is to this effect, Take 63 Gallons of Water that hath been boiled to the Consumption of a third part, then brew it with seven Bushels of *Wheat-Malt*; one Bushel of *Oat-Malt*, and one Bushel of *ground-Beans*; Tun it, but fill not the Hogshead too full at first; when it begins to work, add to it of the inner *Rind* of the *Firre* three pounds, of the tops of the *Firre* and *Birch*, of each one pound, of *Cardus Benedictus* dried three handfuls, Flowers of *Rosa solis* two handfuls, of *Burnet*, *Betony*, *Marjerom*, *Avery*, *Penny-Royal*, Flowers of *Elder*, *Wild-Thyme*, of each one handful and a half, Seeds of *Cardamum* bruised three ounces, *Barberries* bruised one ounce, put the Seeds into the Vessel.

When the Liquor hath wrought a while with the Herbs, and after they are added, let the Liquor work over the Vessel as little as may be; fill it up at last, and when it is stopt, put into the Hogshead ten new laid *Eggs*, the Shells not crack't or brok'n; stop all close and drink it at two years old; some add *Water-Cresses*, *Brook-Lime* and *Wild-Par-sley*,

Sley, of each six handfals, with six handfals of *Horse-Radish*, rasped in every Hogthead: It was observ'd, that *Horse-Radish* made the *Mum* drink more quick than that which had none. If *Mum* be carried by Water it is the better. Thus far the same Author.

Mum, *Ale*, *Beer*, and all such gross bodied Liquors are much refined by carrying them by Sea, and drink much better after such motions than before.

This Liquor thus prepared is very strengthening from the *Malt* and *Beans* it is made withall, and is a great cleanser of the *Reins*, and good against the *Stone* and *Scurvy*, from the great quantity of the *Firre* that is used in it, being of a *Terebinthine-Nature*, and much more wholesome than *Hops*: The Eggs preserve it from being sour, which otherwise in so long time it may be subject to, by reason many of the Ingredients are put in green; which if it were made of dried Ingredients it may very well keep as long without any acidity. Green Vegetables being far more apt to flatten and corrupt any Drinks than dry: As those that make compounded *Ales*, *Metheglin*, &c. can testifie: And as to the

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time

time of keeping it, nothing is more certain than that such strong compounded Liquors are very much improved by time. All those various and different Ingredients being thereby digested into one substance, not to be distinguished by the most curious Palat, but purified and made a most desirable Drink, far exceeding that crude *Mum* that is usually sold to the great disparagement of that which hath been kept its due time, and was at the first duly prepared.

In the first part is a Catalogue of Fruits growing in this Nation, and fit to be planted in your Vineyard, to which I have many to add. But finding that Names signifie little, and the Natures of them are difficult to describe, He that hath a Will to furnish himself with such that are excellent, may have the Trees of Mr. George Rickets of Hoggshden, mentioned in the first Part, who hath the greatest variety of the choicest Apples, Pears, Cherries, Plums, Apricocks, Peaches, Malacotones, Nectarines, Figgs, Vines, Currants, Gooseberries, Rasberries, Mulberries, Medlars, Walnuts, Nuts, Filberds, Chesnuts, &c. that any Man hath, and can give the

the best account of their Natures and Excellencies.

To my first Part I added a small Tract, being a Discourse of the Government and Ordering of *Bees*; and finding that I have here room enough, instead of enlarging that, I will subjoyn a few Pages by way of Essay towards the discovery of the Original of Fountains and Springs, for on such things do our Husbandmen sometimes contemplate, especially when the scorching *Sun*, great *Rains*, or dark-some *Winter nights* forbid their Rural Exercises: All such times are their Minds taken up with thinking how, and from whence *Rains* are produced, and from what cause *Springs* so plentifully flow, and *Rivers* swell to so great a Bulk. To encourage such Enquirers, and furnish them with new matter to whet upon, I have offered the following Essay.

Of the Original of Fountains.

THe Original of Fountains being remote and obscure, is not so easily discovered, as some have thought. Nevertheless have many very able Philosophers attempted to do it; some imagining it to be from one, some from another Cause. I will therefore, amongst other Observators not only, pass my Censure on some of their pretended Discoveries, but cast in my Mite of Enquiries amongst the Treasures of the Learned, for the finding a more probable, if not their true Original.

*1. That
Springs
proceed
from
Rains.*

The first Opinion of the Original or Cause of Springs and Fountains that hath insinuated it self, and is rivited into the Minds of most thinking Men, is, that they arise from Rains, dissolved Snows, &c. For the Confirmation of which, much hath been said and written.

*Reasons a-
gainst it.
1.*

Against which Opinion, I will offer some Reasons: As first, That there is a very great diversity in the Wetness and Driness

Driness of Years; in some Years it rains very much, and in others very little: And especially in the Winter-Seasons, it being easily to be computed that four or five times the quantity of Rains falls in some one Winter as doth in another; yet nevertheless do the perennial Fountains flow, but little more in the more rainy Winter than in the other; or at least the disproportion of the Fountains is not answerable to that of the Rains: As may very plainly be observed in all Fountains issuing out of Rocky and Mountainous places. As in this beginning of the Spring 1685. the clear and swift Fountain floweth with almost as full a stream from *Alresford* to *Winchester* after almost two years drought, as it usually hath done after the most Rainy-Seasons. And in case there be any defect of Water in it now more than formerly, it may be imputed to the attractive vertue of the dry Earth near unto its Springs and Currents in so dry a Season, rather than to its Original; the like I have observed in all perennial Fountains.

That there are many hilly places of several Miles extent, without any Springs or Fountains in any of the Valleys

2.

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amongst

amongst them, and the Lands on such high places are fruitful and inhabited; and where the Rains fall equally plentifully, as they do in the lower and larger Vales, yet are the Wells on such high places digged very deep before they come to the Springs; and those Waters cannot be supposed to be compounded of Rains, Snows, &c. because Rains nor melted Snows descend not so deep. For if they did, then would the Earth, of what nature or kind soever it be, be imbib'd therewith from the Surface, to the resting place of such Waters, and there would necessarily be a continual descent *guttatim*, especially near the bottom of such Wells or resting-places to supply those Fountains, which there is not, as appears in Caves that are deep in the Earth, and Conservatories made for Snow, which are always dry. *Cardanus libro quinto de subtilitate, dicit quod Cuniculos ad evertenda Oppida etiam sub aqua effodiunt, &c.*

3. Another Reason that induceth me to believe that Springs derive not their Original from Rain, dissolved Snow or Hail, is for that there are plentiful Springs and Fountains under so great a quantity

quantity or thickness of Earth, Clay, or the like, that is not penetrable, or rather penetrated by these Waters that are on the Superficies of it. As is most evident on the great Flats near the Sea, which are overflown with Salt or brackish-Waters; yet by digging 40 or 50 Foot through a Bed of Clay, a Spring of most sweet Water hath been discovered, when as the more Salt or brackish-Waters have not permeated through the Clay or Earth to mix with it notwithstanding the vacuity of the Well was large enough to have received it. And it is as evident within the Land, where several small perennial Rivers flow, yet very near the same, are Wells digged 15 or 20 Foot lower than those Waters where Springs are found, which yield great plenty of Water, that have not their Original from Rain percolated through the Earth; for in case they had, then would those Rivers descend also by the same Pores as did the Rain.

A fourth Reason is, For that when Rains fall by easie Showers (as they generally do) the thirsty Earth imbibes and detains them very near its surface, and in a few dry days as easily imparts
with

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with its newly received moisture, that sometimes plentiful Showers (that in case they had been received in a glazed-Vessel, might have filled the same two inches deep,) in three or four days shall be for the most part exhausted again. And this is plainly visible in newly arid or sandy barren Lands; and likewise in Grounds covered with Vegetables, such Rains are soon imbib'd, and as soon disposed of; yet under these Lands usually issue out large and constant Fountains. For I know several constant Springs issuing from under most barren, sandy, heathy Grounds, that are never observed to encrease after the greatest Rains or most wet Seasons, nor to lessen after the driest; and those sandy Grounds for a great distance from those Springs of no greater height, but that great Rains or Droughts would beget sensible alterations in such Springs, had they no other Original than from Rains, or (indeed) had the Rains any commerce at all with them.

5. If we would but consider further how all those Waters are disposed that fall by Rain and Snow, that alone might be a reason sufficient to induce any one to believe

believe that Fountains and Springs have not from them their Original. Instead therefore of wondring what becomes of so great quantities of Rain and Snow, from whence Fountains and Springs should proceed, if not from Rain and Snow, we may rather admire from whence so much Rain should proceed. If it be said to be a conversion of Air into Water, that cannot be, for Air is as perfect body as Water, only it is more porous or spongy, and so more capable to be expanded and contracted than Water is; and thereby adapted to receive great quantities of rarefied Water, and detain it until it be again condensed into its first form: And if Rain be said to be exhaled out of the Sea, that is very improbable as to the whole; in part it may, as from all moist Bodies. For Salt Water is not so apt to distil as sweet Water is; nor do the great Rains (nor Winds which proceed from the same cause) come so often from the Maritime Coast as from the more Inland in the great Continents. But Rain is more properly (as may be supposed with reverence and respect to the more Learned) those Particles or Atoms, that by the heat

heat or virtue of the Sun, are exhaled from the Earth, Waters, Vegetables, and all moist Bodies through the pores of the Air, until they are by its frigidity condensed into those drops that distil in the usual forms of Rain, Hail or Snow, so that no part of the Superficies of this Globe can be said to be exempted from contributing to those fruitful Showers that usually bedew the same; which if it be granted, then the 19 inches and more of Water found by the *French Anonymous Author* to fall in every year, as is mentioned in *Dr. Plats most ingenious Tentamen de Origine Fontium*, Sect. 27. may easily be supposed to be wasted in so many of the 365 days that happen to be dry, windy, frosty or hot, in which the moisture of the Earth is usually exhaled; for in the beginning of April 1683. an inch of Water exposed to the Sun and Air in an Earthen-Vessel was wasted in less than three days. And in case I should presume to say that much more Water was annually exhaled from the Terrene part of this Globe than descended on it by Rains, Snow or Hail: I believe I might find Credit amongst some of those that understand by what influence

influence all things sublunar, have their motion and encrease, which if true, then certainly those vast Fountains that water this Earth have some other Original than Rain, &c. And in case it be objected by any, that the Exhalations from the Sea contribute much towards the encrease of Rain: I answer, That much Rain also falls on the Sea, and not improbably much more than arises from it.

Another Opinion some (and those more Learned than the other) have received, that Fountains proceed from the Sea by subterranean passages, and so return again above the Earth by way of Circulation; that Rivers never want, nor the Sea superabounds with Water.

2. That Springs proceed from the Sea.

One Reason for that Opinion is, that Wells or Pits digged near the Sea are filled with brackish-Water, and those more distant with sweeter, as said Cardanus. And he was likewise of Opinion, that there were sweet Waters under the bottom of the Sea, *Lib. 5. de subtilitate*. It being most true, that such Springs that are composed of Waters percolated through the Sands, the farther from the Sea

1. Reasons for that Opinion.

Sea they are, the more sweet. But those Springs or Fountains that proceed from another cause are as sweet under the Sea as in the highest Mountains, as was that Fountain mentioned by *Pliny, lib. 5. cap. 31.* And as by several other Examples is demonstrable.

A second Reason.

Another Reason that seems to fortifie that Opinion is, That many Springs, Fountains, and other Waters at great distances from the Sea, ebb and flow as doth the Sea next adjacent to such Springs or Fountains, and that several Fountains are Salt, &c. therefore they have a certain Commerce with the Salt Ocean. To which I may answer, That some Springs lying low and near the Sea may ebb and flow at the same time as doth the Sea, by the pressure of the water in the Ocean against the loose Sands, through which the other part of the Water passes that proceeds from the same Head: Nevertheless the Spring that ebbs and flows near *Newton in Glamorganshire*, although but an 100 Paces from the *Severn-Sea*, is at the lowest ebb when the adjacent Sea is at the highest Flood; and when it is low

Water

Water in the Sea, then is the Spring full. As Mr. *Speed* observ'd in his Description of *Glamorganshire*. But that the flux and reflux of Springs that arise at any great distance from the Sea should be caused from the flux and reflux of the Sea, it doth not plainly appear; for that those of any height or distance from the Sea do not usually observe the times of the flux and reflux of the Sea: As that of *Weeding-Well* or *Tides-Well* in the *Peak* in *Darbyshire*. And that the *Cannensian* Territory near to the Lake *Larius*, which every hour ebbeth and floweth, mentioned in *Pliny*, lib. 2. cap. 103. and divers others; only that on the top of the Mountain in *Flintshire* is mentioned by Mr. *Hooke* in his *Micrography*, p. 27. to ebb and flow as the Sea doth; but why then do not the Springs that are lower and nearer the Sea? As for Fountains that are Salt, it may be supposed that their saltness proceeds from some other cause than from its Commerce with the Sea. For if there could be no other cause, then must we suppose that there are *Hot*, *Sulphureous*, *Bitumenous*, *Aluminous* and *Nitrous* Seas, from whence Fountains of those qualities proceed.

But

*Reasons a-
gainst that
Opinion.*

But if we seriously consider upon what mistake that Opinion is grounded, it will not be difficult to wave it, and embrace a more probable. For many are induced to believe that all perennial Fountains derive their Original from the Sea first by large subterranean passages or canals, and then divided into small capillary Pipes; and so by the immense weight of the Air on the Ocean, such Water is forced into smaller Fountains on the highest parts of the greatest Continents; as *Quick-silver* by the weight of the Air without, is raised in the Tube of the *Barometer* within. Or as *Water* is raised in *Glass-Pipes* above the *Superficies* of the *Water* without, by the pressure of the Air on the same, which to me seemeth a very great Mistake.

Because if you fill the *Tube* with *Quick-silver*, and with your Finger, or a piece of Leather, stop the open end thereof, then invert the *Tube*, and suffer the *Quick-silver* to strain out at very small passages below, it will descend equally to the same height, as if the end were placed in a *Stagnum* of the same *Quick-silver*; therefore it cannot be the pressure
of

Of the Original of Fountains. 171

of the *Air* without on the *Stagnum* that must support the *Cylinder* of *Quick-silver* in the *Tube*; for in case also that you fill a *Tube* with a small bolt-head on it with *Quick-silver*, and invert it, that whilst you stop the lower end, the *Tube* is evenly full as in the *Barometer*; yet when you remove your Finger, the *Quick-silver* will descend so far as the extended *Air* will permit it, which will be much lower than that in the *Barometer*. Now if the weight of the ambient *Air* on the Stagnant *Quick-silver* were the cause of the ascent of the *Cylinder* of *Quick-silver* within, then would that arise in the headed *Tube* equally as high as it doth in the *Barometer*; for it is not to be supposed that the weight of so small a quantity of *Air* in the head should depress that which of necessity must be supported by a greater weight without, as is pretended.

Besides, it is most apparent that any warmth artificially applied to the head of the *Thermometer* causeth the *Water* in the *Tube* to sink, and Cold to rise, whereby it indicates the temper of the *Air* ambient on the head, rather than of the whole body of the *Air* as high as

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the

the *Atmosphere*, which last some have supposed by its weight on the *Stagnum* to support the Water in the *Tube*. The same is in the *Barometer*, but with allowance, as to the difference between *Water* and *Quick-silver*.

As to the ascent of Water in Glass-Pipes open at both ends in the smaller Pipes higher than in the larger, that may very well be supposed to arise from the attractive or sympathetical vertue in the Glass, because the nearer the sides of the Glass are the one to the other, the higher doth the Water ascend; for if the Pipes are short, or so depressed, that the tops are near the surface, the Water will not rise high enough to flow over, although the weight of the ambient *Air* on the *Stagnum* be the same, by reason that the attraction is lessened thereby. All syphonical Filtrations, and Mr. *Hooke's* Observations in his *Micrography*, are from the same cause.

Therefore all those Suppositions that are founded on that *Thesis* must stand and fall with it.

But

But the Opinion that comes nearest to the truth of this matter, is, that hinted at by the Learned Dr. *Stillingsfleet*, in the fourth Chapter of the third Book of his *Origines Sacrae*; which is, that the interior heat of the Earth causeth a continual Evaporation of the subterranean Waters, which by the cold Superficies are condensed into Fountains.

3. That Springs proceed from the central part of the Earth by way of Distillation.

To maintain which, it must be supposed that the Earth, as one great Animal, containeth in it a Central heat, which by its own motion (as from the heart in the Body) causeth that continual Evaporation. Now such a heat and motion in an Animal is maintained and fed from nourishment received from without; otherwise it would soon decay. So likewise would it do in this Globe of Earth, in so long time as it hath endured, which being seriously considered of, pointeth out unto us the most probable Opinion.

Of the true Original of Springs.

IF the Celestial Sun be placed in the Center of the Universe, virtually giving life and heat to all things that live and move, according to the Laws of Nature instituted by God himself, as I hope none will deny; It is not the common sensible heat of the Air, by what soever Accident warm'd, that makes Vegetables flourish in the Spring more than in the Autumn. For the Weather is usually much more temperate and sensibly hot in the Autumn than in the Spring: Nor is it the external warmth of the Months of *September* or *October* that excites the Venereal Faculty in most Animals, especially Fowl; but it is the Virtual Influence of the Sun in its approach to his *Northern Hemisphere*, although in cold *January* and *February*, that impregnateth the far greater part of Vegetables and Animals with a power to vegetate, increase and multiply.

It

Of the true Original of Springs. 175

It is not the pressure of the Air, nor the crowding of it into the Pores of the Earth that forceth the ascent of Sap in Trees; nor is that ingenious contrivance of the Laborious Dr. Grew in his *Anatomy of Plants, lib. 3. part 2. cap. 1.* that gives an ascent of Sap in Vegetables. But it is the virtual power of the Sun that attracts the Sap into the Branches from the Root; after it hath given the Seed or Root a power to attract the Aqueous Spirit from the Earth. For it is most plain, that Seeds sown, or Trees standing in Earth not wet, or abounding with moisture, will nevertheless attract a far greater quantity of that Aqueous Spirit for its nourishment, than that Earth contain'd within the extent of their Roots. For the Atoms of moisture that continually perspire, are intercepted by the attracting Roots of Vegetables, where they lie in their way.

Wherefore as Fountains have their Original and Course by the Laws of Nature after a most certain and sure Method; why may we not imagine that the virtual Influence of the Sun on this Orb of Earth, moving by a certain Rule and Order, may not excite, and by

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attraction beget a continual Evaporation or Perspiration of moisture from the subterranean parts thereof, which by the condensation of its superficial Cortex, may reduce part of such perspiring Atoms into plentiful Fountains. And those again by flowing into the great Receptacles of Water, the Seas supply those defects, so great an attraction might otherwise be the cause of.

It may also be supposed, that this Virtual Influence of the Sun, by the same Law of Nature, attracts all those Atoms from the Earth that are not condensed into Fountains as well as those from the Sea, that afterwards are condensed by the Air, and so plentifully besprinkle this Globe, and in some places make so great Inundations.

Seeing then that *Fountains, Rains* and *Snows* may probably proceed from one and the same Cause. The discovery of the Original Cause of *Rain, Snow, &c.* may make that of Fountains more easily to be apprehended. It will not be amiss therefore to offer some Considerations concerning *The Original Cause of Rain, Snow, &c.*

I. The

1. The height of the *Atmosphere* may be considered, which some suppose to be about three Miles in height, above the Superficies of the most even part of the Earth, above which no Clouds move. Dr. *Brown* in his *Enquiries into Vulgar Errors*, lib. 2. cap. 5. is of Opinion, that the remotest distance of Clouds is but two miles; which seems very rational, if we consider, that on Mountains a Man may see over the Clouds every way. And that as the same Author, lib. 7. cap. 6. seems to allow the perpendicular altitude of the highest Mountain to be but four Miles. And the Account that Dr. *Sprat* in his *History of the Royal-Society*, gives of the *Pico* in *Teneriff*, relates it to be but two Miles and an half, yet esteems it to be the highest in the World, whose top is thought to transcend any Clouds, at least such that afford Rain or Snow.

2. It may also be considered, that Clouds carrying *Rain, Snow, &c.* move not far before they waste themselves, or distil on the Surface of this Globe: For great *Rains* have fallen on several parts of this Island, when on other parts about the same time none have fallen. Great *Thunders* have also happened in some

places, when at 15 or 20 Miles distance they have not been heard. *Cardanus, lib. 17. de subtilitate*, will not allow the Clouds to be above 500 Paces, or half a Mile in height, and visible not above 30 Miles. That a Man being in *Milan* cannot tell when it rains in *France*.

3. If then that Clouds ascend no higher, nor are carried far; then must they arise and encrease near where they fall, which is not difficult to demonstrate; It being conspicuous to every Eye, that Clouds, especially such that are most inclinable to afford *Rains*, &c. do from a very small beginning encrease in view to be large and showring, which sometimes fall not far from the place of their Original. And whereas it is vulgarly apprehended that *Rains* are exhaled from the Sea, and carried by the Wind over the Land; it is against Reason to imagine that the *Rains* that come with a Northern-Wind, and fall in the South parts of this Island, should derive themselves from the Northern-Seas, and be carried with so gentle a gale as they sometimes come withall, over so large a tract of Land 3 or 400 Miles, and not demit so great a burden of Water; and much

much more unreasonable would it be to think, that all those great *Rains* that come from the Northwest in the great Continent of *North-America* to the *New-English* and *Virginean-shore*, and those that fall under the *Meridian-line* in *Africa* should be no otherwise extracted than from the remote Seas 30 Degrees, or 1800 *English* Miles distant; especially there in those hot Countries, and here in the warmer Seasons, when *Rains* fall more precipitously than where it is colder.

4. If *Rains*, &c. should be no other than Exhalations from the Sea: It must be considered how all those Vapours and Exhalations from the Earth, from Fountains and Rivers, from Vegetables and Animals, are disposed of. For in Summer time, if you imbibe dry Earth with Water, it will in a few days be exhaled by the Sun, as is evident by a Summer *Rain* that would in an Earthen-Vessel have raised an inch or more of Water, in the space of three or four hot days will be exhaled into Vapours. The same is to be observed in Rivers, Ponds, Fountains, &c. that daily Exhalations do arise from them, especially in the Summer time: And from Vegetables also, which attract

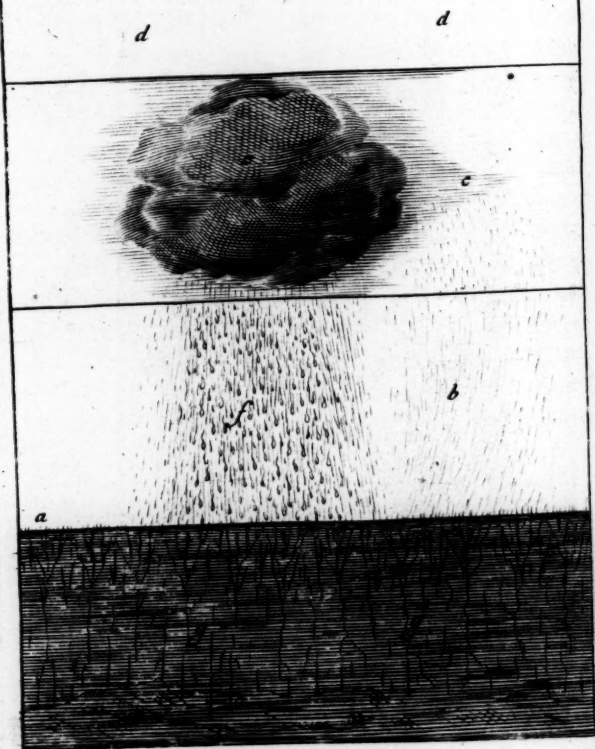
attract unto themselves very much of the subterranean Aqueous Spirit, or *Spiritus Mundi*, which Vegetables do daily (throughout the Spring and Summer time especially) emit great quantities of Aqueous Particles. As some Trees have Floods of such like flowing a long time through their Trunks and Branches into their Leaves, and thence into the Air; as the *Birch*, the *Vine*, the *Walnut*, &c. A plain demonstration thereof is also to be seen in an Acre of Meadow-grass, which being cut in a hot Season, loseth in two days time three or four Tun of its weight, which is attracted by the Air. And every Animal, of any indifferent size, as well as Man, daily perspires some quantity of moisture. And the Air being a spongy Body, and two Miles and more in height, may easily be supposed to contain Water enough (being rarefied) to raise 19 inches and much more, in less than a years time, being condensed into Showers.

It will not then seem strange to assert that *Rains*, *Snow* and *Hail*, are Aqueous Particles, that have been exhaled from the Surface of this *Globe* of Earth and Water, by the Virtual Influence of the *Sun*,

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Fig. I.

Pag. 181.



Sun, and excited somewhat by the Central heat of the Earth, and the Spirits that are in the Vegetables and Animals on the same. And afterwards are condensed by the coldness of the Air into refreshing Showers, cold Snows and Hail, which descend again on the same *Globe*, part thereof imbibing the Earth a little way; the residue which the Earth cannot receive flowing through those infinite number of Canals that conduct it into the Ocean, which in all probability is much more than ever was exhaled from it towards the forming of so great Showers.

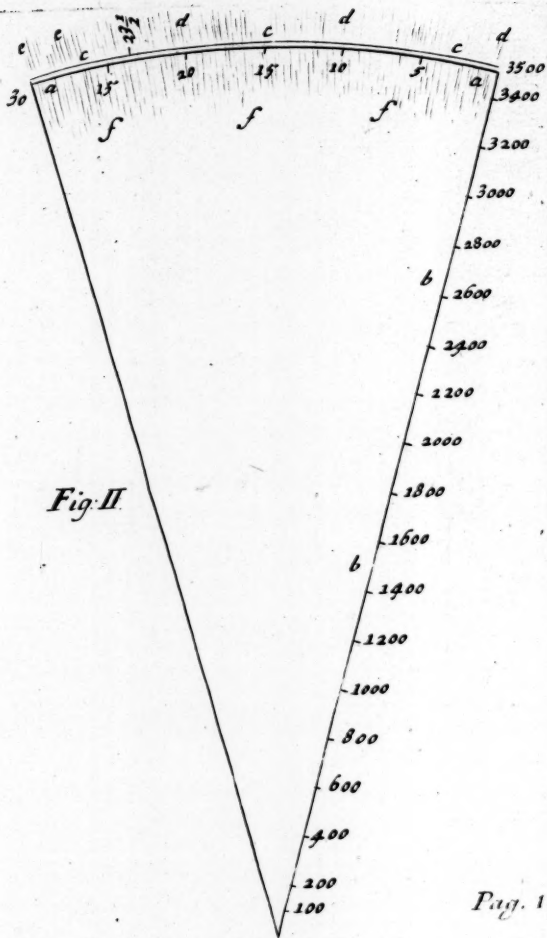
A more plain demonstration of the forming of *Rain* from those Exhalations may appear in the Scheme here drawn: *Fig. 1.* *a.* Represents the Superficies of the Earth, *b.* the Vapours that continually ascend in all dry Weather, *c.* the Region of the Air being the spongy receptacle of the Aqueous Particles, *d.* the cold Region which condenseth those Particles into drops of *Rain*, *Snow* Flakes, or *Hail*-Stones, *e.* the bodies of such Condensations or Clouds, *f.* the Clouds descending in drops, &c. *g.* the perspiring Vapours of the Earth, which nourish

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all things growing on its Superficies, and afford matter for Fountains and daily Exhalations.

After the same manner may those Cataracts of Water that are poured on the Continent of *Africa*, that create the Inundation of the *Nile*, and other *African Floods*, be produced. For it is difficult to imagine that those Waters should be brought from far, if we consider what hath been said; and how small the height of the Clouds are in comparison of the distance of the Superficies of the Earth from the Center of the same; the Semidiameter of this *Globe* being about 3500 Miles, and the height of the Clouds about two Miles, such Clouds must appear to be very near the Earth. And the Original of *Nile* being under the *Meridian-Line*, as *Ludolphus* in his *Ethiopic History* hath discovered, and much nearer than any former Author would allow it, is at least 30 Degrees, or 1800 Miles distance from its fall; And at the time of the *Rains* that fall to raise that Flood, the Winds constantly blow out of the North, as *Mr. Sandys* hath related; how then can it be imagined that so great and immense a quantity of Waters can

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can be carried from the *Mediterranean-Sea* to the Original of that *Flood*? But it is not difficult to imagine the cause of those Floods to be from the before-mentioned *Thesis*, which may the better be explained from the following second Figure.

This Figure Represents so much of the Superficies of the *Globe* as contains 30 Degrees, being near the length of *Nile* from its head to its fall into the *Mediterranean-Sea*, according to the latest Discoveries, as at *a. a.* The line *b. b.* is the distance from the Center to the Circumference, divided into *English Miles*; that thereby may be perceived how near the Water-bearing-Clouds are to the Earth, which may be guessed at by the small Line drawn on the Superficies of the Earth, at *c. c.* *d. d.* represent the *Sun* beams perpendicularly, darting over the 23 Degrees and $\frac{1}{2}$ from the *Equinoctial*, and a little obliquely on the 6 and $\frac{1}{2}$ remaining Degrees without the *Tropic of Cancer* at *e. e.* *f. f.* shew the Vapours or Aqueous Spirits that are continually exhaled from the subterraneous parts, by the Virtual Influence of the *Sun*; not only to furnish the Air with matter for those

those plentiful Showers, but those Fountains with Water, that throughout the year, so plentifully flow from the midst of so large and dry a Territory.

The *Sun* about the 10th of *March* is perpendicularly over the *Equinoctial-Line*; it is supposed that then the *Nile* begins; and about that time the influence of the *Sun* may forceably attract from the inner parts of the Earth an abundance of those particles of Water that may cause so great *Rains* that shortly after happen. And as the *Sun* moveth towards the *Tropic of Cancer*, so doth its Influence operate: For from the middle of *April* to the tenth of *June* the Winds begin to rise from the *Meridian-Line* to the *Tropic of Cancer*, and some short Showers fall during that time.

These Vapours or Exhalations thus attracted by degrees, so soon as they touch the cold Region, are condensed and distil *guttatim* in smaller Showers; but after the *Suns* longer continuance over those parts, and the attraction growing more strong, those Showers or Condensations are the greater, that from the *Suns* entrance into *Cancer* they encrease, and during the month of *July*, and
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whilst the *Sun* is in *Leo*, the *Rains* are very violent, and then by degrees lessen till they end, which is about the time of the *Suns* crossing the *Equinoctial-Line* in its Return towards the *Southern-Hemisphere*.

So that it may with great reason and probability be supposed that the daily Perspirations and Exhalations from this *Globe* of *Earth* are treasured in the spongy body of *Air* during the discontinued times of *Rain*, which in some parts of the *Country* through which the *Nile* runs, happens to be from the end of *September* to the beginning of *April*; and that afterwards the more direct Influence of the *Sun* penetrating deeper into the bowels of the *Earth*, doth excite the heat that is there. (For it is by none denied, that the deeper any *Mines* or *Cavities* are sunk into the *Earth*, the warmer is it,) which causeth so great a perspiration of that *Mundane Spirit*, or of *Aqueous Particles*, that they fill and expand the *Air*.

The *Sun-beams* penetrating through the *Air*, thus replete with moisture, may be the cause of those great heats that are between it and the *Earth*. For the

Sun

Sun gives a greater heat through *Glass*, than through the *Air* only. And the more of moisture there is in the *Air*, so it be finely rarified and transparent (as expanded *Air* is) the more violent is the heat of the *Sun-beams* penetrating through it ; and such sultry heats generally preceed Rains or Tempests in the Summer-time.

After the Celestial and Central *Sun* have thus furnished the *Air* with Matter, the stronger influence of the Celestial *Sun* raiseth or attracteth the same unto the cold Region of the *Air*, which by most is supposed not to be above two Miles and $\frac{1}{2}$ or three Miles above us, where those Particles of Water so finely rarified, are condensed by cold into more dense or gross Bodies, which attain the forms of Clouds, and soon find their way downwards.

Where the *Air* is more gross, the Exhalation weak, and the superior Region temperate, as in the more oblique or Northerly parts, there the distillations are smaller. But where the Exhalations are strong and forceable, the superior Region extream cold, and the *Air* more Rare, as it is nearer the *Equinoctial-Line* than

than at a great distance, as appears by the severity of the cold on the *Pico at Teneriffe*, and other Southerly Mountains, where the Snows lie throughout the year, there the Rains are violent and extr,earn.

From these Exhalations rarified may Winds and Tempests proceed: For when the *Sun* approacheth, the Tropic of Cancer, the Clouds and Northern Winds move towards those Parts (as may be supposed) by attraction. For the influence of the *Sun* attracts those exhaled Vapours from those Northern Parts of *Africa* (that lie low on the *Mediterranean-shore*) somewhat farther on the Continent, where the cold Region of the Air hath more power to condense them than on the *Egyptian* coast (where it seldom rains) from which Vapours proceed those Winds: As may be observed in this Island, that Winds oftentimes proceed from moving Clouds, sometimes from one side of the Cloud, and sometimes from the other. And it is also observed, that soon after Mists ascend the Hills, Winds as well as Rains follow: Therefore Winds may not be supposed to derive their Original from any remote Cause.

But it may be objected, That those
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great Rains that water the vast African Territory, over which the Nile flows, are the Exhalations from the Mediterranean Sea carried by the Northern Winds over it, at the times when the Nile begins to swell.

To which it may be answered, That it is very improbable that so great a quantity of Water can be exhaled out of that Sea, and carried so near to the Earth, to so great a distance as the head of Nile, without being demitted before it come a quarter of the way; the greatness of the Burthen and the thinness of the Air considered, such a Phenomenon is not reasonably to be demonstrated, nor is it easily apprehensible to consist with Nature.

For those Rains that fall on those Parts must be great, for that they water a vast dry Territory, which may require several inches of Water to moisten it, two or three Foot in depth, besides the raising of so great a Flood as the Nile, which increaseth from June 17th to September 24th, and then runs in a declining condition till May following; which River is said to water, by its divided Streams, the Land of Egypt, at the mouth thereof

thereof about 140 Miles in breadth, or at least its fertile part, and usually riseth 24 Cubits perpendicular at the height of its Flood, as Mr. *Sandys* relates.

Now if those Rains do not derive their Original solely by Exhalations from the Sea, as is nor reasonably to be supposed; then is it very likely that they may be Exhalations from the Earth: And if they are such, then may all perennial Fountains be derived from the same Original. For those Aqueous Particles that from the warm interior parts of the Earth, are attracted by the *Suns* superior Influence, or otherwise howsoever to the Superficies thereof, may part of them perspire, and part be intercepted by Minerals, Vegetables, &c. and other part by the cold Rocks, Sands, Clays, Chalk, or the like, be condensed into Fountains.

If therefore that Rains and Fountains have the same Original, then is it not the weight of the Sea that enforceth the Waters through small subterraneous passages to the middle of *Africa*, or any other place to the forming of Fountains. Nor is it the weight of the Saline superficies of the Sea that presseth, the lower part being lighter and less salt, to the ascent

of such high and remote places where usually Fountains flow, as Mr. Hooke in his *Micrography* would have it.

For those large Fountains, or rather Floods that issue out of divers Mountainous parts of the World, are too great to be derived from Rains; and if enforced thither through subterranean Canals by the weight of the Sea, Whence then proceed Rains? And whence do proceed those trickling Waters, and many excellent and exuberant Springs that issue out near the tops of the lesser Mountains about the *Pico at Teneriffe*, but from those penetrating and perspiring Streams condensed by those extrem cold Rocks?

If what is remised be true, then may it be demonstrable how the Rivers, Floods, Fountains and Springs flow into the Sea, which supplieth the interior parts of the Earth with matter sufficient to maintain those perspiring vapours that continually ascend to maintain those Rivers, Floods, Fountains and Springs. So that there hath been, is, and ever shall be a perpetual Revolution of those Waters in which is contained the Natural spirit and life of every Animal, Vegetable and Mineral, in the *sublunar World*, The

The causes of the Ebbing and Flowing of the Sea, of Tempests, Winds, Thunders, various dispositions of Airs, Heats, Droughts, &c. are not difficult to be discovered; the before-mentioned Powers and Influences being granted. For if you observe in Fig. 11. at g. how small a proportion one of those divisions of 10 miles is to the Semidiameter of the Earth, then must one mile be so much smaller, *viz.* as 1 to 3500; Then consider that the highest Tide on our European-Coast is not above 70 Foot perpendicular, which is more than 71 times contained in one of those miles, which is almost imperceptible, being so great a disproportion to the Semidiameter of this Globe; whence it may easily be supposed, that the *lunar* influence impregnated by the *solar*, may by attraction cause so small a motion as the Flux of the Sea. But more of these Matters at another time.

FINIS.

